WORLD'S POULTRY SCIENCE JOURNAL

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MESSAGE FROM PRESIDENT, DR. R. COLES, TO THE MEMBERS OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

It is a great pleasure to have this opportunity to offer New Year Greetings to the members of the World's Poultry Science Association. I am conscious of the honor, and of the heavy responsibility, which the Presidency of this organization confers upon me. Men of great distinction have preceded me in this office, and their continued interest in its activities and attendance at its Congresses are tributes to the intrinsic value of the Association. The outstandingly successful Congress at Edinburgh sets a standard which we should aim to achieve in all our doings. The tragic circumstance which kept Mr. Wm. D. Termohlen away was the only cloud which dimmed the occasion.

In approaching my task, I am sustained by the thought that the men like Ian Macdougall and Gustave Heuser continue to serve the Association. With their guidance and the advice of the Council, I shall hope to uphold the best traditions of my office.

The World's Poultry Science Association is a body primarily concerned with the dissemination of knowledge for the good of the Poultry Industry, in all its aspects, in all parts of the globe. Some narrow minds are unable to embrace the concept of a world in which there is a thriving Poultry Industry in every country; to them it seems that an expansion in one place must be at the expense of a contraction elsewhere. Yet wherever the standard of living is high, there poultry is a flourishing business. Surely then in a world where there are such grave disparities in the living levels of its peoples, we should rejoice to see more birds and more eggs being produced in the so-called backward areas as an indication of the rising standard of life in these places. As rural populations become industrialized, the demand for our products mounts, and so a limitless vision of world expansion opens up.

There is a leading part for the World's Poultry Science Association to play in the drama of plenty versus want. The more our scientists can discover about economic feeding, reduction in losses through disease, increased output, higher food conversion rates and higher fertility and hatchability the greater is the responsibility of the Association to get this knowledge spread throughout the globe. Thereby we make a major contribution to the forces working to overcome under-nutrition.

This is the thought I should like to inspire us all as we pursue our calling, and I hope that, when we meet together and get to know one another better at our next Congress, we shall be able to say that we have not been altogether unequal to the task.

May you all prosper in your honest endeavours!

Rupert Coles

AIR-CONDITIONED LAYING HOUSES SEEN AS FUTURE POSSIBILITY IN USDA TESTS

Government researchers think that "air-conditioned" housing for farm chickens may be economically feasible someday.

Studies underway for about three years hold the promise that air-conditioned housing might pay for itself by promoting more efficient utilization of feeds.

Scientists think that if they can find the best possible temperature and humidity ranges for chickens, egg production might be boosted enough to pay for the cost of air-conditioning equipment.

Agriculture Department scientists have been experimenting with batches of matched chickens to see what effect on egg production is produced by changing temperature, humidity, light and ventilation. They hope to find the best possible conditions for housing poultry. Their study conditions simulate a real farm as far as possible.

At USDA's research center in Beltsville, Md., a special experimental housing unit has been constructed for chickens. Known as a calorimeter, it consists of two rooms, about five by seven feet in floor area, providing room for about 10 mature

hens each. The calorimeter is air tight, lined with copper and insulated, and equipped to give controlled temperature, humidity, light and ventilation.

So far the experiment has demonstrated that temperature and humidity do affect egg production.

Some of the preliminary findings:

1. When temperature is dropped from 85 degrees to 40 degrees feed consumption increases about 40 per cent.

2. When temperature is dropped from 55 degrees to 40 degrees, about 10 per cent more water is consumed. Scientists say that the wet litter problem is more aggravated at the lower temperature than at high temperatures, where evaporation occurs more readily.

3. Above 55 degrees, feed consumption drops, but water consumption rises—so the hen can cool herself by panting and evaporating moisture from the windpipe and lungs.

4. As the temperature drops, eggs become larger with better egg shell quality—but egg production falls.

5. As the temperature rises, eggs become smaller and smaller, until finally mature hens are producing "pullet-size" eggs, often malformed and thin-shelled.

6. No effect on egg production results from changing from a 15-watt to a 40-watt lamp. They are equally good.

So far tests have been conducted at temperatures ranging from 40 to 85 degrees, with about 80 per cent relative humidity. More tests are needed to determine the role of temperature and relative humidity on egg production, litter moisture accumulation, and heat production. In the future the researchers hope to get more data on the environment's effect on egg quality.

Tests have been confined to mature Rhode Island Reds, but lighter breeds may be used later (to get data pertinent to broiler producers).

In running the tests, two groups of chickens having the same total weight and egg production records are placed in the calorimeter—one group in each room. The "usual" farm litter is used; hens are inspected periodically; their feed and water are weighed in and out to determine how efficiently feed is converted into eggs.

The tests are under the direction of Hajime Ota, agricultural engineer with the Division of Farm Buildings and Rural Housing of the Bureau of Plant Industry, Soils and Agricultural Engineering. The Bureau of Animal Industry is cooperating in the long-range study.

POULTRY AT THE INSTITUTIONAL LEVEL IN AUSTRALIA AND NEW ZEALAND

F. SKALLER

C.S.I.R.O. Poultry Research Centre, Werribee, Victoria, Australia

Australia, as one of the big wheat exporting countries of the world, has in relation to her population a large poultry industry. In addition to the many people who produce eggs for their own households in "backyards," about 110 million dozens of eggs are produced commercially and marketed through the State Egg Boards or exported (mainly to the United Kingdom) through the Australian Egg Board. About one third of Australia's commercially produced eggs are exported. Fortunately for the Australian producer, the period of peak production in the Southern Hemisphere and the export season from September to January coincide with the season of low production and higher egg prices in Europe. New Zealand (N.Z.) is in a different position as she is a grain importing country, and therefore, produces for her own home market only.

Australia has a large number of specialized poultry farms, some of them very large with more than 100,000 layers, situated mainly in her two most populous States, New South Wales (NSW) and Victoria (Vic.) where about 70 per cent of all eggs for the market are produced. In South Australia (S.A.) and West Australia (W.A.) egg production is about 20 per cent of the Australian total, mainly as a sideline to mixed or wheat farming. The remaining 10 per cent is produced in Queensland under sub-tropical conditions, and in Tasmania under climatic conditions similar to those of the U.K.

Each of the 6 Australian States and N.Z. have a Poultry Section within their State Departments of Agriculture, mainly for poultry extension work. Special State Veterinary Laboratories provide a diagnostic service for the industry, blood-testing for pullorum, and preparation of vaccines supplementing the work carried out in this field by the Commonwealth Serum Laboratories.

Official "Poultry Improvement Plans" do not exist, but all States have schemes for the accreditation of pullorum-free flocks. All States with the exception of Tasmania have, or are in the process of erecting, one Poultry Experimental Station. The 2 largest are at Seven Hills (NSW) and Parafield (S.A.) with about 5,000 layers each. In addition, State Egg

Laying Competitions have been organized for a long time in N.Z. and all Australian States with the exception of Queensland, where such a Test is conducted by a Poultry Breeders Association, and in W.A. where the erection of a modern Testing Station is being considered at present.

In two states, N.S.W. and S.A., Random Sample Tests have been commenced recently. In N.S.W. the test sample is of 40 one-day old pullet chickens selected at random, whereas in S.A. the sample is of 60 eggs for the "Egg to Layer" Test. About 1,800 pullets can be tested in the present Australian State-conducted tests. Mean egg production has been rather stationary at about 200 eggs (on a survivor basis), over the last two decades; this figure could certainly be improved by more advanced breeding methods. Mortality data, however, are very good, being between 5-10 per cent for all pullets housed at the Test Stations.

In N.Z. there is a Government Poultry Demonstration Plant at Upper Hutt, where the official Laying Trial is also located. In addition, the two N.Z. Agricultural Colleges at Massey and Lincoln have extensive poultry plants, carrying about 3,500 layers. About 12,000 layers are kept by the 5 existing Australian State Poultry Farms, which have an incubation capacity of 41,000 eggs.

The breeds kept are mainly the 2 most popular with the Industry, viz. S.C. White Leghorns and Australorps. Crossbreeding between these breeds has become very popular since C.S.I.R.O. and the N.S.W. Dept. of Agriculture showed that this cross exhibits considerable hybrid vigor and increased egg production.

Experimental work at the State Farms is concerned mainly with day-to-day problems of the poultry industry and is usually of a short-term nature. Feeding tests and research into management practices have first priority. Present experiments deal with the feeding of Antibiotics, Vitamins and Sorghum, Hormone implantation, breeding for better egg quality (Vic.) and a crossbreeding programme by Reciprocal Recurrent Selection. (N.S.W.) Results are published in the Agricultural Journals issued by all State Agricultural Departments, and also in leaflets and farmers' bulletins.

Fertile eggs, chickens and young cockerels are sold by most State farms in small batches in order to benefit the largest number of breeders.

Specialized poultry research and training is not at present undertaken by Australian Universities, but Agricultural

Colleges, where Diploma Courses are given and where University students have to spend some time to gain practical experience, maintain poultry flocks under modern conditions of management.

Research of a more fundamental and long-term nature is the responsibility of the Commonwealth Scientific and Industrial Research Organization (C.S.I.R.O.) The Poultry Research Centre (P.R.C.) of its Division of Animal Health and Production was established in 1946 at Werribee, near Melbourne, (Vic.) The P.R.C. has facilities to accommodate 5,000 layers and over 1,000 cockerels, in addition to the growing stock for replacement purposes raised from 10,000 pedigreed hatched chickens during a 2-months' breeding season. About 3,000 pullets are housed in individual laying cages under optimal and well controlled environmental conditions, and the system of artificial insemination in practice involves the use of about 100 Sires and 1,000 female breeders. The main research project is a comparative study into the value of different systems of selection and mating, including inbreeding and crossbreeding. Adequate statistical facilities are available for the genetical analysis of this breeding project. Laboratory facilities have been provided for the second major research project which deals with the physiology of reproduction. These studies are at present concerned mainly with long- and short-term storage of fowl-semen, and with causes of infertility in the fowl; the technique of labeling sperm with radioactive phosphorus (P^{32}) is in use. Technical papers from the P.R.C. are published in the C.S.I.R.O. scientific journals, chiefly the Australian Journal of Agricultural Research, or in overseas Journals, such as Poultry Science.

Contact between State and Commonwealth poultry Officers is established through a Sub-Committee on Poultry Production of the Australian Committee of Animal Production, an advisory body to the Australian Agricultural Council. The Council is composed of State and Commonwealth Ministers of Agriculture and frames Australia's Agricultural policy.

At present special measures are under consideration to raise the efficiency of the poultry industry in view of the unfavorable ratio between feed cost and egg prices, caused mainly by the fall of egg prices on the English market.

INDICATED PRODUCTION OF EGGS IN SPECIFIED COUNTRIES, 1954

The indicated production of eggs in 1954 in a group of countries for which estimates are available is indicated at approximately 90 billion or 12 percent greater than that of a year earlier and approximately 70 percent greater than the prewar, 1934-38 average.[1]

Most of the increase, compared with 1953, is accounted for by increases in Canada and in the United States. Increases also are indicated for Denmark, the Netherlands and Belgium. In other reporting European countries 1954 production is expected to be about the same or slightly larger than in 1953.

The indicated increase in egg production in the major countries reporting an increase, is mainly the result of an increase in the number of hens and pullets, although there also has been some increase in the rate of lay in a number of reporting countries. Adequate feed and *good egg prices* outside the United States and Canada have also tended to stimulate egg production. In many Western European Countries the feed-egg price ratio has been quite favorable.

Egg production in *North America* countries in 1954 is expected to be greater than that of a year earlier mainly as a result of increases in the United States and Canadian production. A combined increase over 1953 of over 4 percent is indicated for these 2 countries. Sharply increased numbers of pullets on farms at the beginning of 1954 was an important factor in both countries. The Mexican government recently announced that the Mexican Bank of Foreign Commerce will grant credit to the poultry industry to continue increasing domestic egg production.

Increases in the surplus producing countries of Denmark and the Netherlands are accounting for most of the expansion of egg production in the reporting countries of *Europe*. These increases are occurring in spite of the fact that their Government egg contracts with the United Kingdom were terminated this year.

These increases by major surplus producing areas in Europe were made partly in anticipation of an increasing United Kingdom market, which would provide good prices

[1] United States, Canada, Belgium, Denmark, Western Germany, Ireland, Sweden, Switzerland, the United Kingdom, and Argentina are the countries used for the averages. See Table Page 2.

and favor a short distance shipper, due to the discontinuance of controls. The following information and Table, which shows United Kingdom supply during specified winter months of different years, seem to warrant these increases.

During the period January-July 1954 United Kingdom egg imports of 2,340,000 cases were down 10 percent compared to same period in 1953 despite the marked increase in imports from Denmark. This increase was insufficient to offset the fall in those from Commonwealth countries. The first arrival of South African and Australian eggs this season arrived in August. Furthermore it is not expected that the im-

EGGS

Number produced [1] in specified countries, averages 1934-38, 1946-50; annual 1951-1953, indicated 1954

Continent and Country	Average 1934-38	Average 1946-50	1951	1952	1953	1954
	Million	Million	Million	Million	Million	Million
North America						
Canada—Farm	2,638	4,015	3,611	3,984	4,086	4,320
Total	2,863	4,382	3,954	4,104	4,200	4,500
United States—Farm	35,498	56,535	59,265	60,985	61,704	64,200
Panama	——	[2]53	55	——	57	58
Mexico	——	——	——	——	2,080	2,160
Europe						
Austria	663	369	640	785	845	845
Belgium	1,693	1,584	1,945	2,030	2,175	2,225
Denmark	1,979	1,447	1,962	1,968	2,155	2,220
France	6,200	6,580	7,500	7,000	8,000	7,800
Germany, Western	3,700	2,655	5,000	5,300	5,500	5,500
Greece	550	388	440	490	525	525
Ireland	1,086	893	951	972	980	985
Italy	5,500	4,380	5,500	5,550	5,600	5,600
Netherlands	1,978	1,189	2,075	2,570	2,780	2,900
Norway	369	283	391	392	420	420
Sweden	1,000	1,288	1,390	1,370	1,375	1,400
Switzerland	423	486	529	518	520	520
U. Kingdom Farm[3]	[2]3,871	2,880	4,800	4,700	4,600	4,650
Total[3]	[2]5,098	4,590	6,500	6,300	6,200	6,250
Asia						
Turkey	1,003	859	942	980		1,000
Japan	3,553	970	3,873	4,676	5,140	5,340
Philippine Republic	[4]738	567	845	950	1,015	1,050
South America						
Argentina	1,127	——	3,000	3,000	3,150	3,450
Uruguay	289	323	——	——	330	330
Brazil	——	——	3,330	3,730	3,800	3,780
Africa						
Egypt	751	[5]694	455	520	525	530
U. of S. Africa[6]	——	——	960	955	970	960
Oceania						
Australia[7]	708	1,418	1,288	1,230	1,230	1,200
New Zealand	430	[8]146	[8]180	[8]185	[8]190	[8]190

[1] Relates to farm production in the United States but many countries not explicit on this point. [2] Three-year average. [3] Years ending May. [4] 1938. [5] For 1947. [6] Years ending June. [7] Commercial production for years ending June 30. [8] Receipts at Marketing Department Stations, year ending March, which account for 30-40% of total production.—Foreign Agricultural Service, September 20, 1954.

ports from South Africa and Australia will substantially lower egg prices in the United Kingdom thus insuring a continuation of favorable prices.

CURRENT AND PROSPECTIVE SHELL EGG SUPPLIES IN THE UNITED KINGDOM[1]

Month	1953-54			1954-55 2/		
	Home Production	Imports	Total	Home Production	Imports	Total
	Thousand Cases of 30 dozen					
Oct.	[3]790	380	1,170	800	370	1,170
Nov.	[3]784	363	1,147	785	370	1,155
Dec.	1,300	663	1,963	1,370	590	1,960
Jan.	[3]1,353	320	1,673	1,355	320	1,675
Feb.	1,264	233	1,597	1,270	330	1,600

[1] Not complete total as some eggs do not go through packing stations. [2] Forecast. [3] Production includes ex-store eggs.

Source: Monthly Digest of Statistics, Poultry World, Intelligence Bulletin, F.A.S. data.

Egg production in *South America* and the Caribbean is expected to be about the same as a year earlier. However, many of the governments or poultry associations of these countries are promoting their poultry industries, primarily by aiding farmers in the purchase of U.S. laying stocks. Brazil, Ecuador, Colombia, Panama, Venezuela and the Dominican Republic are *now carrying* on such programs.

A summary of this information appeared in the September 20, 1954 issue of *Foreign Crops and Markets.*

(This is one of a series of regularly scheduled reports on world agricultural production approved by the Foreign Agricultural Service Committee on Foreign Crops and Livestock Statistics. It is based in part upon reports of U.S. Foreign agricultural officers. Foreign Agriculture Circular FPE-4-54. November 9, 1954. United States Department of Agriculture, Foreign Agricultural Service, Washington, D.C.)

RESEARCH IN POULTRY BREEDING

Institute of Genetics, Ohio State University
Columbus, Ohio, U.S.A.

Two new sex-linked genes in the domestic fowl have recently been identified and studied by Edward F. Godfrey and R. George Jaap. One gene is concerned with body size and the other with a semilethal condition.

The effects of the sex-linked body-size gene were first observed in crosses between Rose Comb Black Bantams (1.2 pounds) and Barred Plymouth Rocks (6.5 pounds) using barring, silver and rapid feathering, three sex-linked markers. This gene, a dominant, was found to add nearly 0.5 pound to the body weight of the bird at maturity.

The second sex-linked recessive gene causes a "jittery" condition in a newly hatched chick. The affected chicks exhibit a twisted neck, a distinct muscular incoordination and sometimes a rapid shaking of the head. Linkage results indicate that the sex chromosome linkage group is twice as long as previously suggested.

A new autosomal recessive albinism in the turkey is being studied by Earl Moore at the Ohio Agricultural Experiment Station in Wooster. This differs from the sex-linked incomplete albinism previously reported for the turkey.

The pilgrim "characteristic" in geese which causes the male to have white and the female gray plumage is the subject of a genetic analysis by R. George Jaap and Everett L. Dakan.

Comparisons of the effects of different mating systems, upon meat and egg production are being analyzed by John F. Grimes, Theo H. Coleman and R. George Japp. Mating systems under test include individual and family selection within closed populations, crosses between non-inbred strains, crosses between populations having a coefficient of inbreeding of more than 50 per cent, and inbreeding together with recurrent selection against a closed-population tester strain.

These researches are integrated with those of the United States Regional Poultry Breeding Project. R. George Jaap is chairman of the technical committee for this project, which includes the twelve North-Central Agricultural Experiment Stations.

A modified diallele design is being used to measure genotypic differences in growth rate by R. George Japp and Alan F. Gristwood, the latter a graduate fellow from the Scottish Department of Agriculture.

The genetic and environmental causes for variation in the development of the Bursa of Fabricus are under observation by Bruce Glick. The function of this "cloacal thymus," the lymphatic structure which hypertrophies during early growth and atrophies prior to the onset of puberty, is not understood.

TRANSMISSION OF *STAPHYLOCOCCOSIS* IN TURKEYS STILL UNSOLVED

ROYAL A. BAGLEY and WAYNE BINNS
Utah Agricultural Experiment Station, Logan, Utah, U.S.A.

How staphylococcosis or synovitis in turkeys is transmitted is still a mystery and until this problem is solved, little information can be given to turkey growers on how to prevent the disease. However, the disease has been studied for a number of years by the staff of this and many other experiment stations and many of its characteristics and transmitting agencies have been found, but to the present the means of transmission has eluded researchers.

As the turkey industry has grown in Utah staphylococcosis, which was first described eighty-two years ago by Prahl, has become one of the most important disease problems the industry has to face. Losses can be quite variable in different years and in different flocks, running from 5 to 20 percent. The disease first appears on the range in birds from 9 to 14 weeks of age and can persist in the flock until marketing time.

CAUSE

Staphylococcosis is a bacterial disease apparently caused by the organism *Micrococcus pyogenes* var. *aureus*. This organism can usually be isolated from infected birds showing typical symptoms. However, there seems to be several strains of the organism which may show up in different flocks. A strain may be likened to a family called Jones which has four boys. Each boy has certain characteristics that make him different from the others, but he still has certain basic characteristics common to all the Jones family. The disease organisms have been found on the ground, in the feeders and watering troughs, and in range houses where turkeys are raised.

Whether there is another agent, such as a virus, that combines with bacteria to cause the disease is not known at present. The question of predisposing factors must also be explored further. Such factors as nutrition, rate of growth, genetics, sex, age, breeds, management, environment, and sanitation are undoubtedly important items to be considered.

DISEASE CHARACTERISTICS

Birds with staphylococcosis become depressed, show a loss of appetite, are reluctant to move, and develop fever. When the bird is forced to move lameness is noted which may be unilateral or bilateral. The hock tendon is swollen, tender,

and has an increased amount of fluid. Birds thus affected may die in one to six days or life may be prolonged over a period of two weeks or more. When the disease takes the chronic form the bird is unable to move about and literally starves to death. The acute form of the disease can cause high losses without producing any marked symptoms of lameness.

TRANSMISSION

Since staphylococcosis is a bacterial disease it must be considered infectious, yet it does not appear to be contagious to any great degree. This conclusion has been established by running infected and healthy birds together with little or no transmission of the disease from diseased to healthy birds. As the organism passes from one bird to another in a flock there is increased virulency and probably the contagious nature of the disease is increased. This is supported by the epidemic form the disease can take, becoming acute and spreading rapidly through the flock in a few days. However, in other flocks it takes a chronic insidious form striking down only a few birds each day.

How the first bird becomes infected is yet to be discovered. The manner in which the disease spreads from one bird

The hock joint is swollen, tender, and has an increasing amount of fluid.

to another is still unknown. The pre-disposing factors such as injuries, contamination of feed and water, and certain phases of nutrition have been investigated without finding that any of them is responsible.

PREVENTION

Since the transmission of the disease is unknown, little can be said about prevention. The possibility of vaccination is being explored. Since the disease is infectious the following practices should help to reduce the incidence: a clean water supply; a balanced nutritional diet with no sudden nor radical changes in feeds; clean equipment, disinfected between seasons. Routine moving of equipment to new ground during the growing season is a sound practice and should always be employed. When the disease starts in a flock the sick birds should be segregated immediately.

TREATMENT

At present recommendations for treatment are more in the nature of what not to use than in a specific remedy for the disease. Various sulfonamides have been tried and found of no value. The following antibiotics have been found non-effective: penicillin, streptomycin, and aureomycin. Some of the newer antibiotics such as terramycin and erythromycin may offer some hopes as they have a greater specificity for Staphylococcus. The question is often asked as to why staphylococcosis is so hard to treat. The answer lies in the fact that the organism spreads to the tissues of the body such as the tendon sheath, wing joints, and the sternal bursa, which are not readily accessible to antibiotics that must rely on the blood stream to reach the bacteria. The areas where the stahpylococci become established have a small blood supply. Again we may be dealing with an organism that is resistant to antibiotics so far used. Undoubtedly the acute form of the disease will respond to treatment much better than the chronic form for the organism is to be found in the blood stream and internal organs.

Research is being continued on the transmission phase of the disease to determine how the organism is spread from one bird to another. When the route of transmission and the various predisposing factors can be explained, then it will be possible to set up a program for prevention. Various new antibiotics and therapeutics agents are being checked as they become available for cures for staphylococcosis. (Farm and Home Science. Utah Agricultural Experiment Station. September 1953.)

SWEETENED BAIT USED IN FLY CONTROL

DR. GEO. S. LANGFORD
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That old adage, "sugar will catch more flies than vinegar," blossomed with new vigor throughout Maryland this past summer. A team of entomologists at the University of Maryland had just finished testing 27 different toxicants for killing flies. Their slogan was: "Effective fly control with maximum safety."

A sugar solution, poisoned with malathion, a relatively new insecticide, appeared most nearly to meet this need. It was effective for freeing barns of flies, and was relatively safe to handle. Farm people who had observed this new bait were convinced a new and dependable fly remedy was in the offing. Dairymen, as well as others who had cooperated in the test work, were enthusiastic. At last they felt a way had been found by which flies that were resistant to methoxychlor, DDT, lindane, etc., could be controlled. Word of its efficiency was spreading from farm to farm.

QUICK AND EASY TO USE

The bait in question consisted of 2 ounces of 50 per cent malathion emulsion, (American Cyanamide Co., New York) 2 pounds of sugar, and 2 gallons of water. Work sponsored by 15 county agents in 51 different stock barns had demonstrated it to be practical and effective for fly control. Some idea of the efficiency and rapidity of action of this bait may be gathered by quoting County Agent Ray Mueller, of Cecil County, Maryland. He said, "We killed over 67,500 flies in less than one hour by applying 2 gallons of the bait to the floor of a dairy barn. Equally remarkable," he said, "was the fact that it took less than 5 minutes to mix and apply the spray." Many farmers report the bait to be the best fly control remedy that they ever used.

Normally flies begin to drop and die within ten minutes after the bait is applied and usually from 80 to 90 per cent of the flies in a barn will be dead and on the floor within from 1 to 2 hours. The length of time a barn will remain relatively free of flies, after treatment, may vary from 3 to 10 days. The lasting qualities of the bait are influenced by conditions in the barn, as well as the fly-breeding conditions around it.

Where concrete floors are treated, washing, scrubbing and liming of the floors naturally removes the bait and elim-

inates the lasting qualities. When the bait is applied to freshly white-washed walls, lasting qualities also appear to be lessened.

THE COST IS LOW

Satisfactory fly control from the bait may be obtained throughout the season if properly used once or twice a week. The application of the bait is easy and simple. Where barns have concrete floors it may be applied to the floors with a sprinkling can, and the operation usually requires no more than five minutes. If a barn does not have concrete floors, excellent fly control may be obtained by applying the bait as a coarse spray with a compressed air sprayer to stanchion pipes, support beams, window sills, door jambs, and other areas where flies are normally found during the day.

SAFE TO USE AROUND ANIMALS

Localities, other than dairy barns, where sweetened baits can be used to good advantage for fly control include horse and sheep barns, poultry houses, hog and calf pens, corrals, garbage heaps, farm yards, porches, and city dumps.

Since malathion, the poison used in the fly bait, is an organic phosphate, many scientific workers feel that flies may not become resistant to it. It also has another advantage in that its toxicity to humans and other warm blooded animals is relatively low as compared with many other insecticides. For that reason it has been approved for use in dairy barns, but those who use it should follow intelligent precaution in its application. Even though its toxicity to warm blooded animals is not great, it must at all times be remembered that it is an insecticide and can be poisonous. Buildings should not be treated until animals have been removed and extreme care must be taken to prevent milk from being contaminated. The baits must never be left where children can reach them or applied in such a manner as to contaminate feed. (American Cyanagrams, Vol. 4. No. 1. 1954)

EGG FACTS FOR CONSUMERS

ROWENA S. MAINLAND

"Eggs are valued for their proteins, vitamins, and minerals, any meal of the day, the year round. Like other important protein foods, eggs should be properly handled to protect their quality.

"Proper handling means cooling the eggs promptly after they are gathered from the hen's nest, and keeping them under refrigeration until they are to be used. (When laid, the temperature of the egg is about 105° F.)

"Refrigeration temperatures for maintaining egg quality for short periods range from about 35° to 45° F., with humidity about 85 percent. A lower temperature is required when eggs are to be stored for several weeks or months.

"At 70° to 80° F., eggs may drop in quality in a few days; at higher temperatures, more rapidly. Therefore, eggs displayed on a counter at the market, held in unrefrigerated storerooms, transported in a hot truck, or left in a hot car or kitchen for several hours, will lose quality.

"It is wise to buy eggs from a dealer who keeps his supply under refrigeration and sells eggs from a refrigerated display case.

"It is equally wise to keep eggs cool in the home, being sure to put them in the refrigerator as soon as possible after buying them, and to keep them refrigerated until they are to be used.

"High-quality eggs are good for all uses, but their upstanding appearance and fine flavor are especially appreciated for poaching, frying, and cooking in the shell.

"Eggs of lower qualities have dozens of uses in which appearance and delicate flavor are less important. They are good for scrambling, to use in baking, in thickening sauces and salad dressings, and to combine with other foods such as cream sauce, tomatoes, cheese, or onions." (Marketing Activities, U.S. Dept. of Agr., Agr. Marketing Service, Washington, D.C., U.S.A., Oct. 1954.)

BREEDING FOR BETTER SHELLS

Hens will lay about 6 billion dozen eggs in the United States this year—but 250 million dozen of them will break or spoil. This annual loss, often running 5 percent, results largely from weak, porous shells.

Weak-shelled eggs have long been an industry problem, and ARS scientists at the Agricultural Research Center, Beltsville, Md., have worked with poultry breeders to solve it.

A hen's ability to lay eggs of desirable shell quality is inherited. It happens that this is a "low" heritability characteristic, making it comparatively difficult to breed and maintain strains that will produce eggs with strong, thick shells.

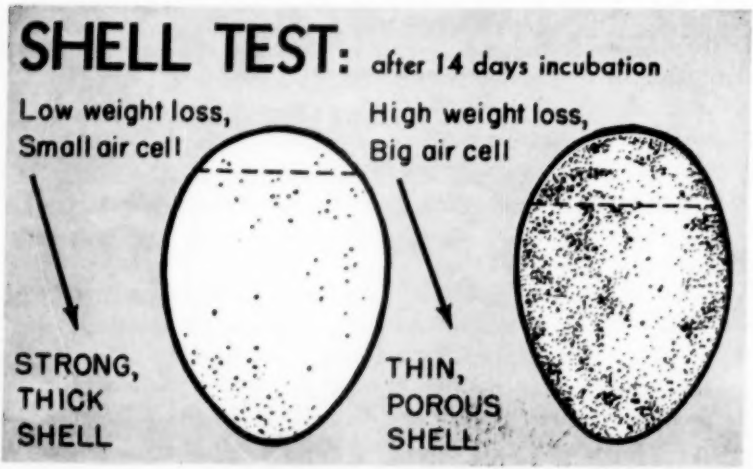
The first step is to select hens that *are laying* the right kind of eggs. This means testing the shells. The trouble is that common tests—measuring thickness, weighing the shell, or checking its strength—require breaking the egg.

Poultry geneticist J. P. Quinn and associates have found a less drastic method that holds promise for commercial use. They determine shell quality by checking moisture loss after 14 days of incubation. This merely applies the fact that eggs with strong, thick shells lose moisture far less rapidly than do those with thin, porous shells. Actual loss can be determined by weighing the eggs or by candling them to determine the size of the air cell.

This method yields results as accurate as those obtained by the egg-breaking methods. Furthermore, by making selections at incubation time, a breeder can improve shell quality in his flock without interrupting his program in other respects.

Quinn and his coworkers are also trying to determine the *degree* of heritability of this characteristic and how it's affected, up or down the scale, by careful selection and breeding. Starting with stock laying hens of medium shell quality, the scientists were able to breed two widely different strains —one producing good shells, the other producing poor shells —in about 2 years.

An 8-year test shows, however, that the work of building for good shell quality is easily lost if selection and breeding are neglected. (Agricultural Research, U.S.D.A., Washington, D.C., July 1954).



NITROFURAZONE AS A CURATIVE AND PREVENTIVE REMEDY AGAINST CAECAL COCCIDIOSIS IN CHICKENS*

PROF. L. de BLIECK
Bilthoven, Holland

Keidel, in his 1951 publication, discusses the principal remedies against coccidiosis in chickens.

He distinguishes between:

1) The pre-sulfa period;
2) the sulfa-period, when the numerous sulfonamides were especially favored;
3) the post-sulfaperiod, when preparations like nitrophenide and nitrofurazone came to the foreground.

The remedies of the first period are no longer scientifically of any importance; those of the second and third period are both of them in use nowadays.

In general we can say that sulfa preparations, especially sulfamethazine and sulfaquinoxaline, are used as remedies, the latter also as a preventive. Both nitrophenide and nitrofurazone are valued for their preventive action, the former being even exclusively recommended as such, while nitrofurazone may be applied as either a remedy or a preventive.

When, in 1952, production of nitrofurazone was started in The Netherlands, experiments with this drug were obviously indicated.

Nitrofurazone (5-nitro-2-furaldehyde semicarbazone) is not a sulfa preparation. In the U.S. it has been manufactured by the Eaton laboratories as early as 1944. Other related compounds were also manufactured, and used against streptococcus, salmonella and other bacterial infections. In 1946 *Dodd* describes the favorable action of this drug against Trypanosomes and Trichomonas.

This induced *Harwood* and *Stunz* (1949) to apply Nitrofurazone (N.F.Z.) against coccidiosis in chickens which led to good results. When fed in an all-mash diet 1:9000 it was curative against E. tenella, the cause of caecal coccidiosis in chickens. In 1950 the same scientists demonstrated that 1:18,000 administered over a long period, prevents coccidiosis even in case of a virulent infection.

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* Lecture delivered at Utrecht on the occasion of the "Animal Nutrition Days," organized by the Central Agricultural Organization, Netherlands, on January 27, 1954.

To obtain a cure, treatment should be started no later than 56 hours at the utmost after initial infection.

These results have been either completely or partly confirmed by others, such as *Peterson* and *Hymas* (1950).

Keidel (1951) and *Bos* made experiments at the Institute "De Schothorst" and reached the conclusion that the favorable effect of Nitrofurazone as a remedy, administered 1:9000 during ten days, was very much in evidence. After receiving sulfamethazine (SM), sulfaquinoxaline (SQ) and nitrofurazone (N.F.Z.), the chickens were compared, as to weight, among each other and with controls. Nothing could be observed in the nature of gain or loss of weight. The SM-group lagged behind, maybe due to the fact that water containing this preparation is rather unpalatable to chickens.

Keidel's preliminary experiments have been continued on a larger scale at "Boekesteyn" (Philips Roxane), where they were supervised by Prof. *Kraneveld* (Institute for Protozoic Diseases, University of Utrecht), and Prof. *de Blieck*. Collaborators were Mr. *Keidel*, Mr. *Hoogendoorn*, Dr. *de Man* and Ir. *Zwiep*.

Very extensive and valuable experiments have been made in England, 1952, by *C. Horton-Smith* and *P. L. Long* of the Poultry Research Station, Animal Health Trust, Houghton, Huntingdon. In January 1953 Mr. Horton-Smith read a paper about this subject for the Dutch section of the W.P.S.A. The authors followed the technique of *Harwood* and *Stuntz* as close as possible, but used different oöcyst doses for the infection, while single as well as serial contamination was applied. The nitrofurazone was also administered in different doses; for curative purposes a higher dose than 1:9000 was given.

They reach the following conclusions:

1) Nitrofurazone is an effective remedy when administered at a food-concentration of 0.022% (1.4500) for 7 days.
2) Nitrofurazone is of value as a preventive at a concentration-level of 0.011% (1:9000), even when the chicks are kept on a heavily infected litter.
3) Nitrofurazone does not prevent the development of normal immunity.
4) The action of nitrofurazone is partly schizontistatic (causing reduction in the second-generation-schizont formation) partly schizonticidal.
5) Nitrofurazone 1:9000 through the mash can be given during 4 months without harmful consequences.

We had therefore a number of indications for our experiments. Yet it appeared that the factors which influence contamination are not always and everywhere the same.

Experiments concerning the curative action offered the least difficulties. It is sufficient either to administer a single large dose (50,000-100,000) sporulated oöcysts) to uninfected two-or-three-week-old chickens, or to carry out a serial infection by dividing this ration over 3 consecutive days. It proved necessary, however, to make quite a number of preliminary experiments in order to determine the virulence and the correct dosing of the oöcysts.

More difficulties appeared in the preventive experiments. It was our intention that the infection should develop in as natural a way as possible. To this purpose a number of two-week-old chickens received a single infection with 8000 sporulated oöcysts—only a small number, but infection-experiments had shown this to be the proper dose. The chicks should get coccidiosis, but they should not die, while as many oöcysts as possible should be passed by them and picked up by other groups placed in the pen, making them mortally ill unless they were preventively treated. In this way the drug could be tested on its prophylactic qualities. The oöcysts, passed by the first group, should infect the litter and get full occasion to sporulate in order to contaminate the next group. Heating the stable proved to be the best method to bring this about. The floor (concrete) was covered with chopped straw and sand, which was continuously kept moist. Each week a considerable number (40-50) of one-week-old chickens was added and this was done four times. When the 3rd and 4th group were added, the 1st and 2nd group were removed because of the difference in age. In one experiment 1320 chickens were used. Table 2 shows the results. Beside examination of the deceased animals, a regular control of the sporulation was carried out by investigating faeces and floor litter.

First let us consider the results of administering nitrofurazone for *curative* purposes.

In some preliminary experiments, in particular those for determining the infection-dose, it appeared that administration of 2000 oöcysts for a period of 5 days consecutively was insufficient; moreover, that administering nitrofurazone 24 hours after the initial infection was definitely too early to obtain an impression of the curative action of the drug. The only accurate and sure method of infection consists in administering a single injection of liquid, containing a large

dose of oöcysts, into the crop by means of a syringe fitted with a rubber tube.

In a comparative experiment treatment with nitrophenide and sulfaquinoxaline was given side by side with nitrofurazone treatment and control groups. The infection-dose consisted of 100,000 sporulated oöcysts; treatment was started 48 hours after infection. Nitrofurazone concentration 1:9000 in the all-mash (feed-meal containing 1:4500 nitrofurazone + corn without nitrofurazone); nitrophenide (Megasul) Lederle (M) and sulfaquinoxaline (Merck) (SQ) were administered according to the indications given by the manufacturers. Further particulars have been mentioned in a more detailed publication. The outcome of this really serious infection, which involved 200 chickens in all, was that 90% of the controls, 65% of the groups treated with M, 2% of those treated with SQ and 32% of those treated with nitrofurazone (1:9000) died with coccidiosis. The latter percentage corresponds with the results of Horton-Smith.

Better results were obtained when, instead of 1:9000 nitrofurazone, a dose twice as large was given. These experiments were carried out at "Boekesteyn." Here also the infection-dose for three- to-four-week-old chickens had first been determined in small-scale experiments and been established at one single dose of 50,000 oöcysts. Food was withheld for 3 hours.

Treatment was started 48 hours after infection with nitrofurazone 1:4500 for 7 days, and with sulfaquinoxaline, partly 0.1% and 0.05% (3-(3)-2-(3)-2) intermittently and partly 0.06% consecutively, for 7 days. The experiments involved 5 groups of 40 three-week-old chickens.

The outcome was that 42.5% of the controls died, whereas of the SQ and nitrofurazone groups only one succumbed (2.5%). All animals of the control groups were seriously ill, varying from a few days to a week. The survivors of the treated groups did not show any symptoms of illness. In the control groups the excretion of oöcysts was considerable, while it was insignificant in the treated groups, which again is proof of the favourable activity of the drug (table 1).

Next let us consider the *preventive* action. Here the outcome of the experiment is even more important, because "prevention is better than cure."

The method used has already been discussed. Again a great many preliminary experiments were necessary to establish the correct infection dose and obtain a continuous and sufficient excretion of oöcysts.

TABLE 1

Curative treatment of chickens infected with E. Tenella with nitrofurazone for 7 days and with sulfaquinoxaline, partly intermittently and partly for 7 days consecutively.

	Groups of 40 22-days-old Leghorns				
		Treatment—started 48 hours after infection		Deaths from Coccidiosis	
Group	Infected with 50,000 sporulated oöcysts of E. Tenella	Nitrofurazone 1:4500 in all-mash	Sulfaquinoxaline in all-mash	Number	%
I	+	7 days	—	1 (7)	2.5
II	+	—	3 days 0.1% 3 days — 2 days 0.05% 3 days — 2 days 0.05%	1 (6)	2.5
III	+	—	7 days 0.06%	1 (20)**	2.5**
IV	+	—	—	17 (10x6; 4x7; 1x8; 2x9)	42.5
V	—	—	—	—	0

* The figures in brackets indicate how many days after infection the animals have died.

** Died 20 days after initial administration of sulfaquinoxaline; the condition of the dead body did not allow diagnosis of the cause of death.

An infection experiment with resp. 7500, 50,000 and 75,000 oöcysts showed that in one case even a dose of 7500 oöcysts was already too much for two-week-old chickens. The birds died too soon, there was no time for oöcyst-formation. Yet, in a larger experiment it appeared that the 3rd group, 14 days after the initial infection (of the first group) picked up the contact-infection very satisfactorily.

Of the controls 54% died; the groups treated with nitrofurazone-0.0055% had 12% losses. If circumstances had not prevented adding a 4th group, better results might have been obtained, as was shown by the next experiment.

In another preventive experiment, carried out in the same way, a 4th group of one-week-old chickens was added. Besides, some of the groups now received 0.0082% nitrofurazone instead of 0.0055% (1:18,000) in the all-mash.

Table 2 records the development. We see that the groups 1a, 2a, 3a, and 4a already show a considerable death-rate from infection with 8,000 oöcysts, owing to the fact that intentionally nitrofurazone treatment was withheld until 5 days after infection. Still, sufficient animals survived and could function as "oöcyst-spreaders." In the contact groups b and c only a few deaths occurred, but in the contact groups

TABLE 2

Preventive treatment with nitrofurazone of chickens, exposed to infection with E. Tenella.

	Number of animals per group	Deaths from coccidiosis	Percentage	Deaths from other causes	Treatment
Group 1					
sub a	40	28	70	0	0.0055%
b	40	0	0	0	Nitrofurazone
c	40	0	0	1	
d	50	0	0	1	
e	50	3	6	4	
Group 2					
sub a	40	21	52.5	0	no
b	40	1	2.5	0	Nitrofurazone
c	40	1	2.5	1	
d	50	10	20	0	
e	50	34	68	2	
Group 3					
sub a	40	22	55	0	0.0082%
b	40	0	0	0	Nitrofurazone
c	40	0	0	1	
d	50	0	0	0	
e	50	2	4	1	
Group 4					
sub a	40	12	30	0	no
b	40	0	0	0	Nitrofurazone
c	40	5	12.5	2	
d	50	20	40	1	
e	50	40	80	2	

d and e the picture begins to get clearer, particularly if one compares group 2e and 4e with group 1e and 3e. It then appears that, whereas in the untreated groups 2e and 4e resp. 31 and 40 deaths occurred on 50 animals, in the treated groups 1e and 3e only 3 and 2 chickens respectively died from coccidiosis. It may be expected that by continuing the experiment even better results will be obtained for nitrofurazone-treated against untreated groups, because of more intensive infection with sporulated oöcysts. In my opinion the foregoing fully warrants the conclusion that nitrofurazone, preventively applied, will reduce the risk of death through coccidiosis to a minimum.

Still some questions arise:

1) Are the animals thus treated immune against infection after treatment has stopped?
   This is undoubtedly the case; by superinfection one cannot make these animals ill—within certain limits of course.
2) Does nitrofurazone cause damage to chickens if the latter are kept for breeding and laying purposes?
   In a recent publication *H. F. Gordon, L. G. Chubb* and

C. G. Stacey inform us that nitrofurazone 0.011% administered in the food for 16 weeks (i.e. twice the concentration prescribed for continuous administration to chickens), had no significant influence on either weight or egg production. A small difference could be observed, in these experiments, as to hatching, without being, however, significant.

In a similar experiment, made with 200 animals, we obtained the same results. The opinion of some investigators that nitrofurazone should act favorably on weight, has not been confirmed by others, nor by us. But loss of weight could not be observed either, at least if one keeps to the right dose.

3) Will protracted nitrofurazone-treatment have damaging effects?

It will; notably riboflavine-deficiency.

A meticulously dosed quantity of vitamin B_2 must therefore be added. Besides, "N.F.Z.-Mix" (Philips-Roxane) contains an additional quantity of vitamin K_3, which stimulates blood-coagulation (coccidiosis being accompanied by haemorrhages). Apart from this vitamin K may help to overcome the shortage of vitamin K-synthesis in the digestive system.

4) An urgent question is: is it admissible that nitrofurazone is incorporated in chicken-food by manufacturers basing themselves on scientifically tested data? I am inclined to answer this question in the affirmative because, nitrofurazone being free for sale, an injudicious use of the drug is to be feared. It is not advisable to trust the poultry-farmer with composing the mixture.

Chicken food containing nitrofurazone should be subject to control and used on farms where an outbreak of coccidiosis may be expected.

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THE USE OF ANTIBIOTICS IN MIXED FEEDS

An article recently published in the poultry journal, "Nutpluimvee," deals with this problem in the following manner. The favorable results obtained in the United States with the use of antibiotics are undoubtedly due, to some degree, to the fact that the rations contain largely proteins of vegetable origin whereas in Belgium, proteins are more likely to be largely from an animal protein source. It is considered that the biological value of these proteins (animal) cannot be appreciably increased by the addition of antibiotics. However, one cannot deny the value of antibiotics and their use can be recommended when: (1) the use of antibiotics permits the manufacturing of efficient feeds more economically. (2) when they have a favorable action resulting in lower feed consumption. (3) when they improve conditions of health.

The considerable opposition which is found in Belgium to the use of antibiotics is because the temporary advantages do not equal the disadvantages which are produced later especially among growing birds. Selection is rendered difficult because the antibiotics interfere with the health status of the animal. However, the use of antibiotics for fattening purposes is looked upon favorably.

In Holland, Dr. Grashuis advises the use of antibiotics only for fattening young stock for market and, under the supervision of a veterinarian, for sick birds.—(F. C. Lievens)

COCCIDIOSIS VACCINE

AUBURN, ALA.—Production of a combination vaccine that immunizes chickens against both cecal and intestinal coccidiosis was announced here today by Dr. E. V. Smith, dean and director, API School of Agriculture and Agricultural Experiment Station.

The new single-dose, multiple vaccine is an improvement over that developed here and released 2½ years ago, which provided protection against cecal coccidiosis, or bloody diarrhea. The combination vaccine also immunizes chickens against three important intestinal types that take a high toll in retarded growth, weight loss, and reduced egg production.

Based on results from critical tests here and from field trials in Alabama, Georgia, and Mississippi, the new vaccine will provide commercial egg flock owners and broiler growers with the kind of protection they have long desired.

Use of the new vaccine follows the same procedure as that of the earlier-developed inoculum. It is administered in the feed of 3-day-old chicks. Thirteen days later, a mild treatment of sulfaquinoxaline is given in the drinking water. Within 28 days the chicks develop enough immunity to protect them against natural exposure.

Since the treatment is given when the chicks are young, only a small amount is needed. The cost is a little over a cent per bird as compared to 2 to 5 times as much for intermittent medication, particularly when outbreaks occur at 4 or more weeks of age.

Other advantages found in tests are: Death losses from vaccination averaged less than a half per cent, with the few losses occurring when value of the chick is low; chickens immunized at an early age grow faster and fewer die than those that develop immunity after four or more weeks; and the vaccine can be used safely on chicks immunized one to five days old against Newcastle or bronchitis.

The multiple vaccine is the second important product to come from research begun here in 1947 by Dr. S. A. Edgar, poultry pathologist, and carried on by him and associates in the Department of Poultry Husbandry. Because of difficulties and problems encountered by poultrymen with various medicants, research was started at Auburn to develop controls of the several types of coccidiosis by immunization.

"The Experiment Station here is the first to offer a coccidiosis vaccine for immunization against both cecal and in-

testinal coccidiosis. The development of this highly effective, low-cost inoculum is an important contribution to the country's poultry industry," D. F. King, department head, commented.

Permission for interstate sale of the vaccine has been granted by the U.S. Pure Food and Drug Administration. The vaccine is being produced in an especially built laboratory where rigid precautions are taken to maintain purity of the product.

The vaccine is released through the Auburn Research Foundation to contracting supply houses where it is now available. (Release, Dec. 8, 1954, The Alabama Polytechnic Institute, Auburn, Ala, U.S.A.)

NOW—A TEST FOR LYMPHOMATOSIS

USDA researchers have found a way to detect the cancerous disease visceral lymphomatosis in live chickens—a discovery termed "highly significant" by Berley Winton, head of the Regional Poultry Disease Laboratory at East Lansing, Mich., (Agr. Res., June 1954, p. 4).

Previously, the only reliable diagnosis of visceral lymphomatisis (sometimes called "big-liver disease") involved postmortem examination of chickens for lymphomatous tumors on internal organs.

This development by ARS poultry-disease scientists S. Lesher (now associated with Argonne National Laboratory) and B. R. Burmester grew out of earlier research by J. W. Beard and coworkers of Duke University. Basis of the test is their discovery that the virus causing a leukemia in chickens contains an enzyme that will react with the chemical *adenosine triphosphate*. This enzyme, known as *adenosine triphosphatase* and a constituent of all animal cells, increases greatly in the plasma of chickens during the growth of leukemia or lymphomatous tumors.

The test works like this: a measured amount of chicken plasma is added to a prepared solution containing adenosine triphosphate and an acid indicator. The enzyme in the diseased plasma reacts with the adenosine triphosphate, stripping it of a phosphate ion within 20 minutes. This causes the solution to become slightly acid. With plasma from healthy birds, acidity doesn't show up for 30 minutes or longer.

In laboratory tests with chickens that outwardly appeared healthy but were tumorous, the enzyme-activity test gave a correct diagnosis in 40 out of 42 cases. Nearly 300 healthy chickens gave negative responses.

Winton considers this discovery an important step forward in the search for knowledge about lymphomatosis—poultry's worst disease. Like human cancer, it has resisted man's research efforts to find a cure.

Practically, the test may help researchers identify visceral lymphomatosis in chickens to be used in disease-transmission and immunity studies. It may lead to development of an effective warning diagnosis to tip off flock owners of the presence of this highly infectious disease. It's not known, says Winton, whether the test will prove of value to scientists studying virus-caused tumors in other animals.

Answers to some of these hopes lie in further research that will show whether or not this test will work on chickens that are infected with the virus but haven't yet developed tumorous growths—or at what stage of tumor development the test does become effective.

(*Visceral* lymphomatosis is top killer and hardest to detect of three forms. *Neural* lymphomatosis—fowl or range paralysis—is next biggest killer and easiest to detect. *Ocular* lymphomatosis attacks the eyes.) (See World's Poultry Science Journal, 10: 339, Oct.-Dec. 1954.)—Agricultural Research, November 1954, Agriculture Research Science, U.S. Dept. of Agriculture, Washington, D.C.

PROPERLY PREPARED LEGHORN HEN IS TENDER AND FLAVORFUL

All too often the little White Leghorn hen is summed up: fine for eggs but not so good as meat.

Yet, millions of mature Leghorns are culled from laying flocks each fall and sent to market. There, shoppers tend to pass them by, seeking fatter fowl—or mistake them for fryers of larger breeds and try frying them with poor results.

Actually, these hens are food bargains and can be tasty and tender if cooked suitably, says ARS food specialist Mary T. Swickard.

Mrs. Swickard and two associates have done some pioneer work in comparing eating quality of mature chickens cooked

by several household methods. The research team chose those problem birds of the market—Leghorns, aged 18 to 30 months.

Results show relationship of eating quality to three cooking methods — steaming, simmering, pressure cooking— in birds of three quality grades, some fresh frozen and others stored frozen for several months.

The trained judging panel, selected from laboratory staff workers, gave the experimentally cooked Leghorns flavor and tenderness scores that compared favorably with those on the more popular Rhode Island Red hens. With the cooking methods that Mrs. Swickard standardized, Leghorn hens cooked all three ways gained similar ratings in the important matter of flavor. The Leghorns had a tendency to be more moist and tender when they were simmered or steamed than when pressure cooked, palatability scores and mechanical tests agreed.

Frozen storage for 7 to 9 months took some toll of eating quality. The flavor of the light meat and the tenderness of the dark weren't quite so good as in birds that were cooked and judged when fresh frozen. (Agricultural Research, U.S.D.A., Washington, D.C., July 1954.)

A SYMPOSIUM OF THE ANIMAL FEED MANUFACTURERS' ASSOCIATION OF BELGIUM

This meeting has been very successful. It was devoted entirely to the study of the preventive use of medicants against coccidiosis. The role which the feed manufacturers can play in this matter is very important since a third of the feeds manufactured by this group are destined for the poultry industry.

In Belgium, there are present principally two forms of coccidiosis—the acute and the chronic. Nitrophenides and nitrofuranes are generally used for the control of coccidiosis. The sulfamides cannot be mixed in the feeds as preventive medication. Professor Willems and Dr. Van Schoubroek give the following concentrations for preventive control of coccidiosis:

Sulfaquinoxaline —0.025%
Nitrofurazone —0.011%
Nitrophenide —0.04 %

—(F. C. Lievens)

REVIEW OF POULTRY PUBLICATIONS

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GENETICS

ASMUNDSON, V. S., and C. F. PUN. (U. California, Davis.)
INHERITANCE OF RATE OF GROWTH IN BRONZE TURKEYS. *Poultry Sci. 33:* 411-415. Illus. 1954.—Data for crosses between 2 strains of Bronze turkeys differing in wt. and in rate of growth indicated that the F_1 progeny tended to weigh more than the larger parents to 16 wks. of age after which the F_1 males weighed more, and the F_1 females less, than the larger parents. The backcrosses on the small parent strain and the F_2 progeny were intermediate in wt. and rate of growth. Correlations showed that half the differences in wt., at 24 and 28 wks. of age, between groups were detd. by differences in rate of growth from 2 to 8 wks., but only 25% or less of the differences in wt. within groups were so detd.—*V. S. Asmundson.* (Biological Abstracts)

AUSTRALIA: COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION. 1952.
A COMPARISON OF BREEDING SYSTEMS. *4th Rep. C.S.I.R.O. Aust.*, 1952: 39-40.—A brief report of this investigation was given in *A.B.A., 20*, No. 863. Results from the F_2 indicate that crossbred (White Leghorn × Australorp) pullets produced an average of 220 eggs, 32 more than the better parent breed (not stated which). The crisscross breed, in which both W.L.s and Australorps were used, produced 219 eggs and excellent results were obtained from a 3-way cross which gave an average of 210 eggs, but mortality in the last was highest. No progress was made in the Hagedoorn system and phenotypic selection based on body conformation has been unsuccessful in maintaining production at the level of the controls produced by random matings. (Animal Breeding Abstracts)

BLOW, W. L., and E. W. GLAZENER. (N. Carolina Agric. Expt. Sta., Raleigh.)
HERITABILITY OF EGG PRODUCTION AND EGG WEIGHT IN TURKEY. *Poultry Sci 33:* 417-421. 1954.—The heritability of egg production and egg wt. in turkeys was estimated from the phenotypic correlations between paternal half sibs, phenotypic correlations between full sibs, and from the intra-sire regression of offspring on dam. An avg. of the 3 estimates for the 2 characters was .127 for egg production and .555 for egg wt. A comparison of the efficiency of several criteria of selection indicated that mass selection was most desirable for egg wt. and family or a combination of family and individual selection for egg production.—*Auth. summ.* (Biological Abstracts)

BLYTH, J. S. S. (Poultry Res. Centre, Edinburgh.)
THE MOSAIC DAUGHTER OF A MOSAIC COCK. *Poultry Sci. 33:* 310-315. Illus. 1954.—A Lt. Sussex × R. I. Red cross male, which exhibited maternal color dextrally and paternal sinistrally, was mated to Brown Leghorn hens. Among 270 of his offspring 1 similarly asymmetrically daughter occurred, but with the reverse pattern. Lateral size differences were present in her skeleton. Through matings with recessive type males all her silver chicks were males, indicating that the white

in her plumage was silver, but a class of non-silver males also occurred. Nothing abnormal appeared in the breeding performance of her progeny. It is suggested that the ovum producing her may have included a polar body which subsequently developed.—*J. S. S. Blyth.* (Biological Abstracts)

BLYTH, J. S. S. 1953. (Poult. Res. Centre, Edinburgh.)
SHANK LENGTH: SEGREGATION IN AN UNSELECTED CHARACTER IN INBRED LINES OF FOWLS. *Heredity, 7:* 433-434. —Shank (tarso-metatarsus) length, a character for which no selection had been practised, was measured in 7 non-interbreeding lines of Brown Leghorns, 6 of which had been selected over long periods for some particular trait. The lines fell into 2 groups, 3 having shank length means of 95 mm. and over, and 4 having means of 92 mm. and under. There was no regular association of shank length with degree of inbreeding, although it was the longest-legged line of each set that was least inbred. With one exception, line means for body weight ranked in the same order as those for shank length. Weight differences between the lines were of long standing and were apparently to some extent inherent in the genotypes necessary for the traits under selection. In 2 small samples of interline crosses, mean shank length was comparable with that of the longer-legged parental group. It is suggested that the different shank lengths now characterising the various lines have resulted mainly from unconscious directional pressure. (Animal Breeding Abstracts)

BUMGARDNER, H. L., and C. S. SHAFFNER. (U. Maryland, College Park.)
THE HERITABILITY OF BODY WEIGHT IN TURKEYS. *Poultry Sci. 33:* 601-606. 1954.—Variance components were isolated from analyses of variance of body wts. of male and female turkeys at 2, 4, 8, 16, and 24 wks. of age. These variance components were used to estimate heritability of body wts. at these ages. 4S/Q+D+S was considered a better estimate of heritability in this study than was 4D/Q+D+S or 2(D+S)/Q+D+S. D-S/Q+D+S was used to estimate the influence of maternal effects and dominance on body wts. Heritability estimates for male turkeys varied from .0250 at 4 wks. of age to .4641 at 16 wks. of age. In the females, these values ranged from .0034 at 4 wks. of age to .3217 at 8 wks. of age. In both sexes, maternal influence was found to have a large influence on body wt., particularly at early ages. Correlation coefficients between body wt. at early ages and 24-wk. body wt. increased as age increased. The values reached .715 for males and .525 for females between the 16- and 24-wk. wts.—*C. S. Shaffner.* (Biological Abstracts)

COCK, A. 1952 (Sch. Agric., Cambridge.)
AUTOSEXING WITHOUT BARRING. *Autosexing annual, 1953. Harlow, Essex: Autosexing Breeds Association.* Pp. 6-8.—The sex difference in down colour present in some old established breeds is contrasted with that developed in the autosexing breeds by the introduction of the bar gene. It has been held that the 2 sex-linked genes for gold (or silver) present in the ♂ restrict dark striping in the down more than the single gene in the ♀. The author does not agree with this interpretation, and considers that either there is another sex-linked restrictor gene present in those breeds which acts similarly to the bar gene, or that the difference arises through the intermediation of the sex hormones circulating in the blood stream.—*J. S. S. Blyth.* (Animal Breeding Abstracts)

DAWSON, L. E., L. R. CHAMPION, J. A. DAVIDSON, and H. C. ZINDEL. (Michigan State Coll., East Lansing.)
IMPROVING EGG QUALITY THROUGH MICHIGAN R. O. P. BREEDERS.—A PROGRESS REPORT. *Poultry Sci. 33:* 293-297. 1954. —In May 1951, a sample of eggs (1 egg from each layer) was obtained from each of 10 R.O.P. breeders. These eggs (1620) were broken-out in the laboratory and albumen quality, shell quality, and incidence of spots were detd. The avg. percentage of thick albumen varied among

flocks from 52.4% to 66.8%. Shell thickness ranged from an avg. of 0.0121 in. to an avg. of 0.0143 in. Percentage of eggs with spots varied from 5.52% in one flock to 66.7% in another. Greatest variation among breeds was found in percentage of eggs with spots. Leghorn eggs had the lowest incidence of spots while R. I. Red eggs had the highest. Least variation among the breeds and strains studied occurred in shell thickness. In April and May, 1952, 1632 eggs from 407 hens (4 Leghorn flocks, 3 White Rock flocks, and 2 R. I. Red flocks) were obtained for quality observations. Egg quality differences among individual hens were observed. Egg quality data obtained for each hen were used as one criterion in the selection of breeders for the 1952-53 breeding season. Quality of eggs from the pullets produced from these matings will be measured. Families which produce eggs of superior quality will be maintained for breeders. This method of research with existing commercial strains of poultry should result in improvement of the general level of egg quality on a large no. of farms.—*L. E. Dawson.* (Biological Abstracts)

FLEURET, P.-H. 1953. (Centre Tech. Conserv. Prod. Agric.)
LA PRODUCTION DU FOIE GRAS DE VOLAILLE DESTINE A LA CONSOMMATION. [THE PRODUCTION FROM POULTRY OF FOIE GRAS AS A COMESTIBLE.] *Ann. Nutr. (Paris), 7:* C97-C124. Discussion: C124-C131.—In the south-west of France 2 types of Toulouse goose are bred for foie gras production; the Gimont, which is declining in favour, is squat and, although it may have a live weight of 14 kg., in general its live weight is low, and it is susceptible to disease; the Masseube is less squat. The Gers is produced by crossing these types and in size and appearance is intermediate between them. Another type, the Montauban, is obtained by crossing the Toulouse and the common goose. The largest, whitest livers are from geese in their first year and French breeders maintain that fattening should be carried out in Oct.-April; data presented show that fatter livers are produced in Jan. than in April. Sexual activity at the time of fattening rather than the sex of the goose influences liver size, although in general ♀♀ fatten more quickly than ♂♂. There were considerable differences in food utilisation and liver size in 11 lines bred. The effect of diet is also included. (Animal Breeding Abstracts)

FLORIDO, RAFAEL. (U. Cordoba, Espana.)
EGG PRODUCTION AND SELECTION. *Arch Zootecnia 2:* 303-342. 1953.—The author considers the genetic factors which affect the production of eggs, and which may be utilized in selection for higher egg production. The following factors were considered; hatchability, the rate of growth of the hen, viability as related to chicks and hens. All the above factors are considered by the author to have genetic value. The 2d group of studies, considers those factors which effect the production of eggs, such as: precocity or the number of days between hatching time and the 1st egg laid: the rhythm of egg laying, the number of eggs laid in a determined period. He also considers the number of hens that never lay, and last in the production group he considers the persistence of laying, in that some hens are not immediately affected by molting. The 3d major group considers the characteristics of the egg as they influence production: size, form, shell quality, and internal qualities. In all cases, he tries to tie his observations with genetic characteristics and interpretations. Charts, tables and graphs are presented to support the theories and observations.—*D. F. Watson.* (Biological Abstracts)

GLEICHAUF, R., and CRETSCHMAR, M. 1953. (BundesforschAnst. Kleintierz., Celle.)
UBER DIE AUSWIRKUNG HORMONALER GESCHLECHTSUMSTIMMUNG AUF DAS GEFIEDER BEI HAHNEN DER KENNFARBIGEN ITALIENERRASSE. [THE EFFECT OF HORMONAL SEX REVERSAL ON THE PLUMAGE OF LEGBAR COCKS.] *Arch. Geflügelk., 17:* 215-229. English summary.—The adult plumage pattern of ♂ Legbars hatched from eggs injected with 250 I.U. or 500 I.U. of the synthetic oestrogen, Foragynol, was normal. In ♂♂, hatched from injected eggs, which received 5 injections of 250,000 I.U. Foragynol

after hatching at 6-weekly intervals, the secondary sex characters were suppressed, but only some plumage characters were feminised. Thus the brass-yellow, red and reddish-gold pigments of the ♂ were suppressed, while in the breast plumage the salmon colour of the ♀ became manifest. The sex-linked barring factor was unaffected by hormone treatment. (Animal Breeding Abstracts)

GOODMAN, B. L., CLAYTON C. BRUNSON, and GEORGE F. GODFREY. (Louisiana State U., Baton Rouge.)
HERITABILITY OF 25-WEEK BODY WEIGHT IN TURKEYS. *Poultry Sci. 33:* 305-307. 1954.—A total of 2067 25-wk. body wts. were obtained from progeny produced by pedigree matings of 14 sires and 164 dams of the Broad-breasted Bronze variety and 9 sires and 104 dams of the White Holland variety during 1952. Avg. body wts. were 19.70 (±1.821) and 12.70 (±1.050) lb. for the Broad-breasted Bronze males and females, and 19.20 (±1.753) and 12.47 (±0.971) lb. for the White Holland males and females. Heritability estimates were obtained by the use of the analysis of variance technique. Estimates calculated from dams tended to be higher than those calculated from sires. Most reliable estimate of heritability of 25-wk. body wts. which was calculated from the site components, was about 0.30 in these 2 populations.—*B. L. Goodman.* (Biological Abstracts)

GUHL, A. M. 1953. (Kansas Agric. Expt. Sta., Manhattan.)
SOCIAL BEHAVIOR OF THE DOMESTIC FOWL. *Tech. Bull. Kans. Agric. Exp. Sta.,* No. 73: 48 pp. (B.)—The subjects reviewed include the measurement of sexual behavior; the effect of social status on productivity of the individual and the effects of social organization on the productivity of the flock as a unit; the role of hormones and heredity; sexual behaviour patterns, heterosexual dominance and mating behaviour, unisexual mating, sexual satiation and compensatory sex behaviour, social dominance among cocks and among hens in relation to mating behaviour and variations in the sexuality of cocks. (Animal Breeding Abstracts)

HALE, R. W. 1954.
RAPID EARLY FEATHERING OF CHICKENS. *The research and experimental record of the Ministry of Agriculture, Northern Ireland,* 1952. *Belfast: H.M.S.O.* Pp. 38-46. (Author's summary and conclusions.)—Observations on the White Wyandotte flock at the Agricultural Research Institute of Northern Ireland showed that chick feathering in the first few weeks was largely controlled by the sex-linked allelic series in which a recessive gene leads to rapid feathering of the type characteristic of Leghorns. It was found that rapid feathering prevented the action of other genes leading to poor feathering at around 2 mths. of age. Moreover feather picking rarely occurred amongst rapid feathering chicks.

Statistical analysis of the chicken weights at 8 wks. of age showed that, in the Hillsborough flock at least, rapid feathering was not connected, to any significant degree, with more rapid growth. Such a conclusion is in agreement with other results published since the work on this flock was begun. The data available from the flock were not suitable for studying the effect of rapid feathering on chick mortality or on adult performance, but it is generally concluded from other investigations that there are no advantages of importance to be obtained in these directions.

In the Hillsborough flock, the rate of feathering could be used with reasonable accuracy for determining sex, when rapid feathering cocks were mated to slow feathering hens. Sexing in this way by mating light-breed cocks to heavy-breed hens is not sufficiently reliable for commercial use because the gene for rapid feathering is carried, in at least a low frequency, by most stocks of the heavy breeds. (Animal Breeding Abstracts)

HALE, R. W. 1954. (Queen's Univ., Belfast.)
HERITABILITY OF CHICK VIABILITY IN A WHITE WYANDOTTE FLOCK. *J. Agric. Sci., 44:* 221-226.—Over a 7-yr. period of

selection 2 sections were established within the flock, showing resp., high and low viability between hatching and (usually) 8 wks. age. During this period mortality in the high viability section decreased by about 40%. When all years and sections were pooled, total mortality to 8 wks. was found to have a low heritability in the flock (0.073±0.005 between sires, 0.1429±0.006 between dams, 0.1039±0.006 joint). The greater heritability between dams than between sires may be due to non-genetic maternal effects, such as differences among hens in the nutritive value of their eggs. The "between sires" estimate is regarded as more reliable. Although it is possible that heritability of viability in the brooder house may differ considerably from that at later stages, certain published figures for adult viability are very similar to those found in the above investigation. (Animal Breeding Abstracts)

HAYS, F. A. (U. Massachusetts, Amherst.)
FACTORS AFFECTING SEX RATIO AT EIGHT WEEKS IN RHODE ISLAND REDS. *Poultry Sci. 33:* 230-234. 1954.—Possible factors affecting the sex ratios of families of pedigreed Rhode Island Red chicks at 8 wks. of age have been considered over a 5-yr. period from 1946 to 1950. Data include the sex ratio on 614 families. Neither annual egg production of dams nor egg production during the hatching season had any affect on sex ratios in chicks. There was no evidence that egg wt. during the hatching season influenced the sex ratio. Sex ratio was independent of the degree of inbreeding which was at a low level in the flock. Age of sires with a range from 1 to 4 yrs. showed a significant effect on the sex ratio of chicks. In general, the older the sire, the higher the sex ratio. It may be postulated that males gradually lose their ability to fertilize female-producing eggs. In contrast, there was no evidence that age of dams affects the sex ratio. Data do not indicate that hatching date or degree of fertility influence sex ratio. Hatchability has a considerable influence on sex ratio. Low hatchability is associated with high incidence of female embryo deaths, resulting in high sex ratios from low-hatching hens. Post-embryonic mortality to the age of 8 weeks. had no significant effect on the sex ratio at 8 wks. To discover if heredity influences sex ratio, various relationships were studied. There was some evidence that sires from high sex ratio families transmit sex-linked lethals to their offspring. Dams do not show such transmission to their offspring. There was no association between the sex ratios of offspring of either sires or dams and the sex ratio of offspring of their daughters. In general, data do indicate that age of sires and hatchability of dams have a significant effect on sex ratio of chicks at the age of 8 wks. There is some indication that sires from high sex-ratio families do transmit sex-linked lethals to their offspring.—*F. A. Hays.* (Biological Abstracts)

JULL, M. A.
SEX-LINKED PLUMAGE COLOR INHERITANCE IN GEESE. *World's Poultry Sci. Jour. 10:* 44. 1954.—Abstract from Arch. Geflügelkunde. 17(7/8): 163-179 (by Martin Lühmann). (Biological Abstracts)

KIMBALL, ELLIOT. (Clinton Exptl. Farm, Clinton, Conn.)
GENETICS OF BIRCHEN PLUMAGE PATTERN IN THE FOWL. *Poultry Sci. 33:* 472-481. 1954.—A dominant mutation in *Gallus gallus* is descr., entailing restriction of black in breast feathers of the male, and without discernible effect on female-type plumage. The allele, *Rb*, producing red breast occurs at an autosomal locus. A phenotype reminiscent of that observed in the Streaky-breasted Game is the result. Gene *Rb* appears to be enhanced in effect by the wild type restriction factor, R, and is overridden in the female by estrogenic melanization. —*Elliot Kimball.* (Biological Abstracts)

KNOX, C. W., and STANLEY J. MARSDEN. (U.S. Dept. Agric., Agric. Res. Serv.)
BREEDING FOR INCREASED EGG PRODUCTION IN BELTSVILLE SMALL WHITE TURKEYS. *Poultry Sci. 33:* 443-447. 1954.—Egg production of Beltsville Small White turkeys to June 1 and for 9 mos. (October 1) was materially increased by simple selection methods

based on individual trap nest records. The same methods of selection increased non-broodiness in turkeys. Avg. egg production to June 1 was increased from 64.5 eggs in 1944 to 104.3 eggs in 1951 and for 9 mos. (avg. egg production to October 1) was increased from 79.6 to 146.2 eggs. Non-broodiness was increased from 19 and 14% during 1944 and 1945, respectively, to 75% non-broody in 1951.—*C. W. Knox.* (Biological Abstracts)

KUZNECOV, L. R. 1953. (Kiev Vet. Inst.)
VEGETATIVNAJA GIBRIDIZACIJA PTIC. [VEGETATIVE HYBRIDIZATION OF BIRDS.] *Priroda [Mosk.], 42 (4):* 117-118.—The experiments were carried out in 1951-52. After natural incubation for 26 hrs. 6 ml. albumen was withdrawn through a hole (0.6 x 0.6 mm.) in the shell of a Leghorn egg 1.5 cm. from the round end, and replaced by 6 ml. albumen from a domestic duck egg; the hole was sealed up and incubation continued. The cockerel which hatched out had the head and neck of a normal cockerel but had a wide breast, narrow wings close to the body, a tail like that of a duck, and long skin-coloured legs, and all the rear part of the body was duck-like; the plumage was greenish, dark brown, grey and white.

A chick from a hen's egg to which 4 ml. of albumen from a hen's egg was added 9 hrs. after the start of incubation hatched out 48 hrs. early and weighed 1.17 g. more than the controls. A healthy duckling hatched out of a duck egg to which 3 ml. albumen from a hen's egg was transferred 9 hrs. after the beginning of incubation. The embryos died in 3 hen eggs to each of which 4 ml. albumen from duck eggs was transferred. (Animal Breeding Abstracts)

LUCHMANN, M. 1953. (Inst. Haustierk., Univ. Kiel.)
UBER DIE GESCHLECHTSGEBUNDENE VERERBUNG DER FARBUNG BEI DER KREUZUNG VON WEISSEN UND GRAUEN GANSEN UND IHRE BEDEUTUNG FUR DIE ZUCHTUNG VON KENNRASSEN. [ON THE SEX-LINKED INHERITANCE OF COLOUR IN CROSSES BETWEEN WHITE AND GREY GEESE AND ITS IMPORTANCE FOR THE REARING OF AUTOSEXING BREEDS.] *Arch. Geflügelk., 17:* 165-179. (English summary.)—Crossing experiments between grey and white varieties of the domestic goose (derived from *Anser anser* L.) and between domestic geese and the Chinese goose *(Cygnopsis cygnoides* L.) have given results consistent with the hypothesis that the factor controlling or modifying the formation and distribution of melanin is sex-linked. Grey domestic ganders mated with white domestic geese produced light blue-grey ♂ progeny and wild-grey ♀♀. Matings between the F_1 heterozygotes gave grey or light blue-grey ganders and grey or white geese. A heterozygous light blue-grey F_1 gander crossed with white geese produced white or light blue-grey ♂ offspring and white or grey ♀ offspring. When a white gander was mated with wild-grey geese the ♂ F_1 offspring were all light blue-grey, whereas the ♀♀ were white. The mode of inheritance of color was similar in crosses between the white domestic goose and the Chinese goose; the dark grey types were, however, intermediate between the wild-grey of *A. anser* and the paler grey of *C. cygnoides*, and the distribution of pigment was intermediate in character. The results of matings between grey and white varieties of the Chinese goose were not in accordance with those found in the intergeneric crosses or in the crosses between domestic geese. (Animal Breeding Abstracts)

MORLEY, F. H. W., and J. SMITH.
A COMPARISON BETWEEN RECIPROCAL CROSSES OF AUSTRALORPS AND WHITE LEGHORNS. *Agric. Gaz. N. South Wales 65(1):* 19-21. 1954.—Data from a breeding expt. at the Seven Hills Poultry Expt. Station, involving different strains, indicate the cross of White Leghorn male with Australorp female produced more eggs than reciprocal crosses when housed in large units. In all strains, the Australorp male and White Leghorn female cross had lower mortality, heavier wt. at 11 wks. and 500 days, was later maturing, and showed more broodiness. Production during spring mos. did not appreciably differ among strains, breeds, or housing units, but in autumn and winter there

were noticeable differences. Strain differences were present in most characters and may be useful material for selection.—*L. G. McNeill.* (Biological Abstracts)

PEASE, M., and COCK, A. (? 1951.)
RETARDED PIGMENTATION. A NEW GENE AFFECTING DOWN COLOUR AND PATTERN. *Autosexing annual,* 1952. [*Harlow, Essex*]*: Autosexing Breeds Association.* Pp. 9-12.—Light Sussex were crossed with Brussbars and the plumage pattern of the latter recovered by backcrossing. The Brussbars so extracted usually bred true but 2 exceptional ♂ chicks with pure white plumage appeared among their progeny. As adults they became indistinguishable from normal Brussbars. The character behaves as a simple autosomal recessive. In the ♀ its action reduces the width but not the sharpness of the dark stripes in the down.—*J. S. S. Blyth.* (Animal Breeding Abstracts)

SCHUMANN, H. 1954 (Inst. Tierz. Erbpath., Freie Univ., Berlin.)
DIE LETALFAKORTEN DES GEFLUGELS. [LETHAL FACTORS IN POULTRY.] *Arch. Geflügelk., 18:* 65-71. (English summary.) Extract from *Vet. Med. Dissertation,* "Die Erbleiden des Geflügels," *Freie Univ., Berlin.*

SCHUMANN, H. 1954.
DIE ERBLEIDEN DES GEFLUGELS. [INHERITED DEFECTS OF POULTRY.] Extract from *Vet. Med. Dissertation, Freie Univ., Berlin.* 31 pp.—The defects are described and the mode of inheritance indicated from the literature. The references have not been printed here. (Animal Breeding Abstracts)

SYKES, G. 1954.
PRACTICAL PROBLEMS IN THE PROGENY TESTING OF POULTRY. *Proc.Brit. Soc. Anim. Prod.,* 18th Meet. 1953: 61-69. Discussion: 69-75.—Use of the trap-nest and dam selection in poultry are considered uneconomic. Sire tests using random samples of progeny are advocated. Whether a large or a small number of sires should be tested is considered, and a test scheme for the medium-size breeder is outlined.

In opening the discussion T. E. Whittle further elaborated the problems attendant on progeny testing poultry from both theoretical and practical viewpoints.—*G. Wiener.* (Animal Breeding Abstracts)

WEGNER, R.-M. 1953.
DIE ENTWICKLUNG, STELLUNG UND BEDEUTUNG DER KENNHUHNRASSEN IN IHREN URSPRUNGSLAND ENGLAND. [THE DEVELOPMENT, POSITION AND IMPORTANCE OF AUTOSEXING BREEDS IN THE COUNTRY OF THEIR ORIGIN, ENGLAND.] *Arch. Geflügelk., 17:* 99-135. [B.] (English summary.) Extract from *Dissertation,* "Gebrauchskreuzungen und Kennhuhnrassen in England. Eine Untersuchung über ihre Entwicklung, Stellung und Bedeutung in der englischen Geflügelwirtschaft," *Inst. Tierz. Tierfütter., Univ. Bonn.* (Animal Breeding Abstracts)

PHYSIOLOGY

BUCKNER, G. DAVIS, W. M. INSKO, JR., AMANDA HARMS HENRY, and ELIZABETH FAULL WACHS. (Kentucky Agric. Expt. Sta., Lexington.)
THE COMPARATIVE RATES OF GROWTH AND OSSIFICATION OF THE FEMUR, TIBIA AND METATARSUS BONES OF MALE AND FEMALE NEW HAMPSHIRE CHICKENS HAVING CROOKED KEELS. *Poultry Sci. 33:* 397-400. 1954.—Comparative rates of growth and ossification of the bones named in the title above are discussed, and compared with the same bones from similar chickens of the same breed having straight keels, and published in Poultry Sci. 1950. Vol. 31, pp. 628-632.—*G. D. Buckner.* (Biological Abstracts)

CACIOPPO, F. (1st Chim., Fac. Med., Univ. Naples.)
COMPORTAMENTO DELLA COCARBOSSILASI (APP) NELLE UOVA DI POLLO DURANTE IL PERIODO DI INCUBAZIONE. [BEHAVIOR OF COCARBOXYLASE (APP) IN HEN'S EGGS DURING INCUBATION.] *Boll. Soc. ital. Biol. sper.*, 1952, *28*, 1966-1968.—It had been shown previously that the content of vitamin B_1 in the hen's egg declined rapidly on incubation (Abst. 4222, Vol. 23). Cocarboxylase was estimated by the method of Westenbrink (Abst. 2936, Vol. 11) in 94 eggs of White Leghorn hens before and at intervals up to the 18th day of incubation. The content of cocarboxylase was low before incubation but immediately increased to an extent corresponding with the great decrease in free vitamin B_1. From that point of maximum increase it decreased gradually, but even by the 18th day was still considerably higher than before incubation.—*E. M. Hume.* (Nutrition Abstracts and Reviews)

CLEGG, R. E., and R. E. HEIN. (Kansas State Coll., Manhattan.)
P^{32} DISTRIBUTION IN THE SERUM PROTEINS OF THE CHICKEN. *Science* 1953, *117*, 714-715.—Eight-week-old chickens were given P^{32} by mouth and half received an injection of diethylstilboestrol. Serum was taken from the blood of these birds and from laying hens which had eaten ^{32}P.

Electrophoretic component 1 was present and had a high activity in oestrogen-treated birds and laying birds, but was absent from non-laying birds which were not treated with oestrogen. Component 5 was present in the sera of all birds but was increased and had a greater activity in laying and oestrogen-treated birds than in non-laying and untreated birds.—*R. Hill.* (Nutrition Abstracts and Reviews)

DER, A.
CONNECTION BETWEEN THE GROWTH AND THE HATCHING WEIGHT OF CHICKS. [A CSIRKEK NOVEKEDESENEK ES KELESI SULYANAK OSSZEFUGGESE.] *Agrártudomany*, Budapest, 1954. 3. pp. 83-84.—The authors made examinations to this effect on more than 2000 baby-chicks of various breeds, to establish at which weight the chicks are most suitable for raising, respectively, which is the most suitable weight of hatching-eggs for incubation. Of the healthy chicks, 7 weight-groups of 200 chicks each were formed, the lightest chicks of 37.5 g. were placed in the first group, the chicks weighing 45 g. in the seventh group. Between the weight of the chicks of the other groups there was a difference of 1.5 g. The weekly weight increase of every group up to the age of 10 weeks was exactly established. Their rations were composed of the usual chickenfood. The food-consumption, however, was not established, new experiments to this effect are considered desirable.

Based on this experiment, the author established, that from a hatching point of view, it is not advisable to raise chicks of under 40.5 g., nor is it recommendable to hatch chicks of over 45 g. In this weight-group bone-softness frequently occurred and the feather growth was unsatisfactory. The greatest percentage of mortality occurred in the group of 41 g. chicks.

As the weight of the just-hatched-out-chicks is ¼ part smaller than the weight of the egg when put in for hatching, it must be concluded that from the breeding point of view, we must endeavor to hatch eggs from 54 to 57 g. (Hungarian Agricultural Review)

FOX, THOMAS W., and B. B. BOHREN. (Purdue U., Lafayette, Ind.)
AN ANALYSIS OF FEED EFFICIENCY AMONG BREEDS OF CHICKENS AND ITS RELATIONSHIP TO RATE OF GROWTH. *Poultry Sci. 33:* 549-561. 1954.—Individual feed efficiency and growth studies were conducted with 4 breeds. Efficiency was studied utilizing the derivative of the law of diminishing increment relating efficiency to weekly body wt. A covariance analysis provided a method of statistical control to estimate efficiency corrected for growth differences. Breed and sex differences in gross efficiency were found to be largely a reflection of growth differences. The correlation between gain and efficiency was +.60, a figure in good agreement with correlations between

these 2 variables reported in other classes of livestock. These studies indicate little justification for commercial breeders practicing selection on the basis of food requirements.—*Authors.* (Biological Abstracts)

FRANCISCO, RAIMO, H. (Div. Zootec. Nutricao Animal.) English summary.

ESTUDO DA PRODUCAO DE OVOS NA RACA PEQUIM E SUAS PRINCIPAIS CARACTERISTICAS BIOLOGICAS. [EGG PRODUCTION BY PEKIN DUCKS, AND THEIR CHIEF BIOLOGICAL CHARACTERISTICS.] *Bol. Indust. animal, Sao Paulo,* 1952, *13,* 103-109.—Four Pekin ducks were studied. Sexual maturity was reached at 161 days of age when the average bodyweight was 2615 g. Average yearly egg production was 178 and average egg weight 78.4 g. Maximum bodyweight was reached after 9 months and was, on the average, 2855 g.

The average composition of the whole egg, yolk and white, respectively, was: water 67.4, 48.2, 86.5; protein 14.7, 17.9, 11.8; fat 16.2, 32.3, 0.07 and ash 1.1, 1.6, 0.62 per cent.—*P. C. Jowsey.* (Nutrition Abstracts and Reviews)

JOHNSON, A. S. (Central Exptl. Farm, Ottawa, Canada.)

ARTIFICIAL INSEMINATION AND THE DURATION OF FERTILITY OF GEESE. *Poultry Sci. 33:* 638-640. Illus. 1954.—A successful technique for obtaining semen from ganders and for inseminating female geese is descr. A preliminary estimate of duration of fertility in geese is 9.7 days. Time required to establish fertility varied from 2 to 5 days, as compared with 1 to 2 days for turkeys.—*A. S. Johnson.* (Biological Abstracts)

KALTOFEN, R. S., and UBBELS, P. (? 1953.)

OVER HET KEREN DER EIREN BIJ MACHINAAL BROEDEN. [ON THE TURNING OF EGGS IN ARTIFICIAL INCUBATION.] *Meded. Rijksinst. Pluimveeteelt* [*Beekbergen*], No. 52: 8 pp. (English summary.)—In a series of 6 experiments, continuing the investigations reported in No. 1179, the percentage of fertile eggs that hatched was 78.02 when the eggs were turned once an hour during incubation *v.* 74.71 when the eggs were turned 8 times every 24 hrs. Of all eggs set the percentage hatched was 66.31 *v.* 62.8. (Animal Breeding Abstracts)

McCARTNEY, MORLEY G. (Pennsylvania State U., State College.)

THE PHYSIOLOGY OF REPRODUCTION IN TURKEYS. 4. RELATION OF FREQUENCY OF MATING AND SEMEN DOSAGE TO REPRODUCTIVE PERFORMANCE. *Poultry Sci. 33:* 390-391. 1954.—White Holland turkey pullets were mated: (1) with 0.05 ml. of semen at intervals of 2 wks. and 3 wks. respectively, and (2) with 0.025 ml. of semen at intervals of 2 wks. and 3 wks., respectively. During the 12-week period following the onset of mating, differences in fertility, hatchability and poult production among females mated by artificial insemination at 2 mating intervals and with 2 dosages of semen were found to be non-significant. It is suggested that for the most efficient use of semen and labor, turkey breeders should inseminate their flocks with 0.025 ml. of semen at intervals of 3 wks.—*Auth. summ.* (Biological Abstracts)

MOOKERJEE, S. 1953. (Chittaranjan Cancer Hosp., Calcutta.)

EFFECTS OF TEMPERATURE-FASTING ON THE STRUCTURAL ORGANIZATION OF CHICK EMBRYOS. *Roux' Arch. Entw-Mech. Organ., 146:* 537-543.—A study was made of the effects of preincubation storage of Leghorn eggs on the morpho-genesis of the blastoderm when the eggs were subsequently incubated for 48 hrs. When incubation was delayed for less than 7 days morphogenesis was not adversely affected. Developmental anomalies were observed, however, in eggs stored for 12 or more days. Storage for longer than 20 days resulted in an increasing incapacity of the embryo to develop. (Animal Breeding Abstracts)

OLOUFA, MOHAMED M. (Cairo U., Egypt.)
INFLUENCE OF THYROPROTEIN AND DARKNESS ON EGYPTIAN CHICKEN DURING SUMMER. *Poultry Sci. 33:* 649-652. 1954.—A total of 135 Egyptian hens 2 to 3 yrs. of age were divided at random into 3 groups of equal nos. One group served as the control, the 2d was put in a dark room from 12 noon until 2 p.m., and the 3d group was given thyroprotein in the ration at the rate of 5 g./100 lbs. of feed. The expt. lasted for 3 mos. from June 1 to August 31, 1953. Present results indicate that thyroprotein caused a significant increase in egg production especially in the 1st 2 mos. of the expt. However, feeding thyroprotein had no effect on egg wt., with a slight effect on body wt. It is also concluded that in summer hens should be kept indoors during the scorching heat of the day. Furthermore, the place should be cool but not dark.—*M. M. Oloufa.* (Biological Abstracts)

OLOUFA, M. M. 1953.
PT. 2. EFFECT OF THYROPROTEIN FEEDING ON BODY WEIGHT OF EGYPTIAN CHICKEN. *Bull. Fac. Agric. Fouad I Univ. [Cairo], No. 26:* 9-13.—The growth rate of 94 chicks fed thyroprotein at the rate of 10 g. per 100 lb. food for 12 wks. from hatching was significantly less than that of an equal number of controls, and mortality was 22% higher. (Animal Breeding Abstracts)

ORTH, E. 1953. (Inst. TierzLehre, Landw. Hochsch., Hohenheim.)
BEOBACHTUNGEN UBER DAS WACHSTUM VON HUHNERN NACH DEM SCHLUPF. [GROWTH OF THE FOWL AFTER HATCHING.] *Arch. Geflügelk., 17:* 285-292. (English summary.) Extract from *Dissertation, Landw. Hochsch., Hohenheim.*—Seven groups each of 10 White Leghorn chicks hatched on the same day were weighed and slaughtered at 1 day, 1, 2, 4, 8, and 16 wks. and at 2 yrs. 6 mths. of age and 60 skeletal measurements made (53 of length and width and 7 of weight).

The time required for each bone to double in size, as well as the total increase in size, varied for each bone, but they were similar for bone groups. Skull measurements showed the smallest and those of the sternum the greatest increases after hatching. The limbs increased in width more than in length, while the reverse was true of the pelvis and skull.

The period of greatest absolute growth varies for each measurement; the increase in size for all is least between 16 wks. and 128 wks. Consideration of relative growth rates indicates the 1st week to be the greatest period of growth except for the skull which shows the greatest relative increase in the 2nd week. (Animal Breeding Abstracts)

PAAL, S.
THE ELIMINATION OF BROODING WITH A VIEW TO INCREASING EGG-PRODUCTION. [A KOTLAS MEGSZUNTETESE A TOJASHOZAM FOKOZASA CELJABOL.] *Allattenyesztes,* Budapest, 1954. 1. pp. 89-94.—One of the ways to increase the egg-yield of hens is to shorten the brooding period, whereby, from the point of view of egg-production, the number of unproductive days is reduced. The author studied the biology of brooding and made examinations with a view to eliminate brooding. He worked out a method by which the broodiness of the hens can be stopped by irritation of the brain with a 24 volt alternate current. He imparts information about the instruments used and explains their functions. He treated more than 2000 brooding hens by this method.

In 70% of the examined cases egg-production began after a treatment of from 13 to 17 days. In 20% of the cases,—but solely with hens just beginning to brood at the time of the treatment—the egg-production resumed after a pause of 2 to 4 days. In further 10% of the cases egg-production began only after 25 to 40 days from the beginning of the treatment. Besides the increase in egg-production, another advantage of this method is, that the brooders did not, even after the first treatment, go and sit back again in the brooding nest and so did not disturb their laying mates, whereby also the control of the laying nests became more reliable. The treatment is simple and can be carried out quickly

and easily. The manipulation can easily be learned. 40 to 50 hens can be treated within an hour by one worker. (Hungarian Agricultural Review)

QUAGLIARIELLO, E., FIDANZA, F., DELLA PIETRA, G. and SCALA, E. (1st Chim., Fac. Med., Univ. Naples.)
INTERRELAZIONE TRIPTOFANOACIDO NICOTINICO NELL'UOVO DI POLLO NEL CORSO DELLO SVILUPPO EMBRIONALE. [INTERRELATION OF TRYPTOPHAN AND NICOTINIC ACID IN THE HEN'S EGG DURING EMBRYONIC DEVELOPMENT.] *Arch. Sci. biol., Bologna*, 1953, *37*, 355-368. (Nutrition Abstracts and Reviews)

RAMSAY, A. O. 1953. (McDonogh Sch., McDonogh, Md.)
VARIATIONS IN THE DEVELOPMENT OF BROODINESS IN FOWL. *Behaviour, 5:* 51-57. (French summary).—Observations were made on the development of broody behaviour in laying and non-laying Cochin Bantam hens confined in brooder house runways with chicks aged 1-7 days or with young mallard ducklings. Maternal behaviour developed fairly slowly, and there were marked individual differences in the response of the hens to the young birds. Socially dominant hens were slower to accept chicks than were less aggressive ♀♀. Immature hens and laying hens tended to react more slowly than non-laying adults. None of the experimental birds developed an incubation patch. The response to ducklings was generally more rapid than the response to chicks. (Animal Breeding Abstracts)

RANDLES, CARL A. JR., and ALEXIS L. ROMANOFF. (Cornell U., Ithaca, N. Y.)
A PRELIMINARY STUDY ON THE HATCHABILITY OF CHICKEN EGGS SUBJECTED TO SHAKING AGITATION. *Poultry Sci. 33:* 374-377. 1954.—Expts. were initiated to test the possibility that shaking agitation might provide the "turning" requirement of incubating chicken eggs. A standard commercial incubator was modified to provide rates of shaking varying from 115 to 431 oscillations/min., amplitude 1.27 cm., and variable duration. The shaken eggs hatched significantly better than unturned eggs (58.7% and 33.0%, respectively), but not as well as control eggs (90.5%). Best results were obtained in the range of 216 oscillations/min. for 1-3 sec. An improvement in the exptl. egg trays was suggested.—*C. A. Randles, Jr.* (Biological Abstracts)

RAUCH, W., and STEINKE, L. 1953. (BundesForschAnst. Kleintierz., Celle.)
UBER DEN EINFLUSS DER EISCHALENPOROSITAT UND DER EISCHALENDICKE AUF DAS SCHLUPFERGEBNIS VON BRUTEIERN. 2. MITTEILUNG. [THE EFFECT OF SHELL POROSITY AND THICKNESS ON HATCHABILITY. 2.] *Z. Tierz. Züchtbiol., 62:* 61-66.—The highest hatchability percentages for 1077 eggs of Leghorn hens occurred when shell pore diameter was 18-30 μ, and those for 531 eggs of Legbar hens were recorded when shell pore diameter was 5.10-10.15 μ. Hatchability was related to loss in weight during incubation. In the eggs from Leghorn hens hatchability was optimal when shell thickness was 0.26-0.3 mm. (Animal Breeding Abstracts)

SCHMIDT, F. 1953. (Inst. Anim. Prod., Jagiellonian Univ., Crakow.)
WPLYW KAZEINY JODOWANEJ JAKO DODATKU DO KARMY KURCZAT NA ICH PRZYSZLA NIESNOSC. [THE EFFECT OF IODINATED CASEIN ADDED TO THE DIET OF PULLETS ON THEIR FUTURE EGG PRODUCTION.] *Roczn. Nauk rol., B, 66:* 23-47. (Russian and English summaries; abstract mainly from English summary.)—The administration of small doses of iodinated casein (0.013-0.023 g. daily) to R.I.R. pullets for 86 days (until the first experimental bird started laying) did not hasten sexual maturity; an increase in body weight was observed from the 50th day after supplementation of the basic diet began. Av. monthly egg production was higher (3.6 more eggs) in the experimental birds than in the controls, but there was no significant difference between the 2 groups in egg weight. (Animal Breeding Abstracts)

SHOHYOE TSUDA. 1953.
[EFFECTS OF TESTOSTERONE ON BOTH MALE AND FEMALE FOWLS.] *Sci. Bull. Fac. Agric. Kyushu Univ., 14:* 169-179. (Japenese with English summary.)—In 8 ♀ and 6 ♂ birds subcutaneous injections of testosterone stimulated comb and wattle growth, inhibited egg production and spermatogenesis, and significantly decreased testis, ovary and oviduct weights. Live weight was not affected. (Animal Breeding Abstracts)

STEARMAN, R. L., T. G. WARD, and R. A. WEBSTER. (Dept. Biostatistics, Johns Hopkins Univ., Baltimore, Md.)
A STATISTICAL ESTIMATE OF VARIATION ENCOUNTERED IN STUDYING DISPERSION OF RADIOACTIVE PHOSPHORUS IN EMBRYONATED CHICKEN EGGS. *Arch. Biochem. Biophys.*, 1953, *45*, 397-410. (Nutrition Abstracts and Reviews)

TAUFEL, K., and R. POHLOUDEK-FABINI. (Inst. Ernährungsforsch., Potsdam, Rehbrücke.)
VERTEILUNG DER CITRONENSAURE IN VOGELEIERN UND IHR VERHALTEN BEI DER BEBRUTUNG. [DISTRIBUTION OF CITRIC ACID IN BIRD'S EGGS AND ITS BEHAVIOR DURING INCUBATION.] *Ztschr. Lebensmittel-Untersuch. Forsch.*, 1953, *96:* 397-405.—Colorimetric estimations of citric acid by the pentabromoacetone method in a series of 8 eggs from Leghorn hens showed that of the total citric acid content per egg, taking the average for the series, 73.69 per cent was contained in the shell, 19.84 per cent in the yolk and 6.47 per cent in the white. The range of variation in each part was considerable, in the shell, for example, the average amount of citric acid per egg was 7.06 mg. with a range from 4.00 to 9.09 mg.; in the yolk the range was 1.51 to 2.38 mg., and in the white 0.46 to 0.92 mg. Analysis of single eggs of other domestic birds showed that for the turkey, guineahen and bantam the greater part of the citric acid was contained in the shell, as in the hen's egg, but for the goose, duck and pigeon the greater portion was within the egg. Incubation tests on hen's eggs showed that during development of the embryo there was endogenous formation of citric acid. The significance of the experimental data is discussed.—*M. B. Richards.* (Nutrition Abstracts and Reviews)

WEBSTER, R. A., and T. G. WARD. (Dept. Microbiol., Sch. Hyg. Pub. Health, Johns Hopkins Univ., Baltimore, Md.)
THE DISPERSION OF RADIOACTIVE PHOSPHORUS IN THE EMBRYONATED HEN'S EGG. *Arch. Biochem. Biophys.*, 1953, *45*, 384-396. (Nutrition Abstracts and Reviews)

WILGUS, H. S., and W. W. SADLER. (Colorado Agric. Expt. Sta., Fort Collins.)
INCUBATION FACTORS AFFECTING HATCHABILITY OF POULTRY EGGS. 1. LEVELS OF OXYGEN AND CARBON DIOXIDE AT HIGH ALTITUDES. *Poultry Sci. 33:* 460-471. 1954.—Addition of O_2 increased hatchability of chicken and turkey eggs at high altitudes, although marked differences in resistance to hypoxia of embryos from different hens were observed. Optimum O_2 level at 5000 ft. altitude was 23 to 23.5% with a CO_2 level of 0.5%. The length of the incubation period was prolonged at low CO_2 levels.—*H. Branion.* (Biological Abstracts)

NUTRITION

ALMQUIST, H. J., and J. B. MERRITT. (The Grange Co., Modesto, Calif.)
THE RELATION OF FIBER LEVEL IN MASH AND GRAIN TO GAIN AND ECONOMY OF BROAD BREASTED BRONZE TURKEYS. *Poultry Sci. 33(2):* 434-435. 1954.—Broad Breasted Bronze toms and hens 14 wks. old were fed mashes of 7.5, 6.6 and 5.7% fiber and either barley or milo, as whole grain, available at all times. As mash fiber levels were increased, the selection of milo (2.2% fiber) increased in the cases of both hens and toms. On the other hand, the selection of

barley (5.8% fiber) decreased. It is evident that under a free-choice system the turkey will vary grain selection not only according to mash fiber level but also according to grain fiber level. The milo-fed birds made best and most economical gains.—*H. J. Almquist.* (Biological Abstracts)

ANDERSON, G. W., S. J. SLINGER, and W. F. PEPPER. (Dept. Bacteriol., Ontario Agric. Coll., Guelph.)
BACTERIAL CULTURES IN THE NUTRITION OF POULTRY. 1. EFFECT OF DIETARY BACTERIAL CULTURES ON THE GROWTH AND CECAL FLORA OF CHICKS.

ANDERSON, G. W., S. J. SLINGER, W. F. PEPPER, and M. M. HAUSER. (Dept. Bacteriol., Ontario Agric. Coll., Guelph.)
2. EFFECT OF DIETARY COLIFORM CULTURES ON THE GROWTH AND CECAL FLORA OF POULTS. *J. Nutrition*, 1953. *50*, 35-46; 47-57.—1. Sixteen groups of 20 male chicks were given a basal diet supplemented with one of 5 bacterial cultures isolated from the caeca of chicks, with or without 10 p.p.m. procaine penicillin. Pooled caecal contents from 5 birds were well mixed and 1 g. was used for plating; *p*H estimations were made on the remainder of the sample. The cultures used were of typical *Bacterium coli*, 2 strains of atypical *Bact. coli*, micrococci and anaerobes. The basal diet supplemented with penicillin alone caused increases in weight which were not significant. One of the atypical *Bact. coli* cultures caused a significant weight increase without penicillin, and all 3 coliform cultures with penicillin gave greater weights than without, or than penicillin alone. Two of these increases were significant and indicated a synergistic reaction between the corresponding culture and the antibiotic. The micrococci without penicillin depressed the weight of the chicks, but this inhibitory effect was completely removed by administration of penicillin with the culture. No weight increase was observed with or without penicillin when the anaerobes were given, but feed efficiency was greater.

In a second experiment 10 groups of 20 chicks of both sexes were given the basal diet as in experiment 1 either alone or supplemented with a mixed culture of the coliform bacteria used separately in experiment 1, or the filtrate or the washed cells from the centrifuged mixed culture. Part of each group received penicillin as well. A significant increase in weight was recorded only in the group receiving filtrate plus penicillin. In both experiments penicillin tended to reduce the *p*H and the numbers of bacteria which could be isolated from the caeca of the chicks. When, however, the antibiotic was given with the cultures, the *p*H reduction was not so marked. Changes in the numbers of aerobes, anaerobes, coliform bacteria, lactobacilli and enterococci resulted from giving the cultures with or without penicillin. In a few cases the changes were significant but in no case was there a clear shift to the type of culture used. It is suggested that the association of greatest weights and feed:gain ratios with the lowest enterococci counts may be of importance.

2. A mixed culture of coliform bacteria isolated from the caeca of chicks receiving penicillin caused a non-significant increase in weight of poults when given in conjunction with a practical ration and penicllin. Washed viable cells from this culture gave similar results. Neither the filtrate nor the killed cells from this culture caused any change in weight. A typical *Bact. coli* culture produced a significant increase in weight. When given along with penicillin this culture slightly enhanced the activity of the penicillin. An atypical *Bact. coli* culture increased the weight of female poults, but this increase approached significance only at the 5 per cent level. No change was found when this culture was given with penicillin. As before, the *p*H of caecal contents was reduced poults when given in conjunction with a practical ration and penicillin. and coliform cultures to the diet could not be related to the changes in numbers of the types of bacteria isolated from the caeca of the poults.—*M. J. Masson.* (Nutrition Abstracts and Reviews)

ATKINSON, J. C., R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State U., State College.)
THE INFLUENCE OF TERRAMYCIN AND AUREOMYCIN ON

GROWTH, VARIABILITY, AND EFFICIENCY OF FEED UTILIZATION IN WHITE HOLLAND TURKEY. *Poultry Sci. 33:* 332-344. 1954. —Terramycin and Aureomycin were used in 3 expts. to supplement practical type diets fed to White Holland turkeys. The effects on growth, variability, and efficiency of feed utilization were measured. As little as 2.25 g. of Terramycin/ton of diet increased growth rate to 8 wk. of age. In the 3d expt. to 28 wk. of age, 4.5 g. of Aureomycin/ton increased rate of growth on a flock basis. Turkeys that received the antibiotic only during the 1st 8 wk. weighed no more than the controls at 28 wk. of age. This removal of the antibiotic at 8 wk. increased variability from 12 to 28 wk. of age. In general variability declined with increasing age and from 12 to 28 wk. females were more uniform than males. Antibiotic supplementation did not influence efficiency of feed utilization during the 1st 8 wk. but higher efficiency resulted when the diet contained meat scrap and fish meal than when it was devoid of those ingredients. No effect on mortality was observed as a result of antibiotic supplementation. All data were evaluated statistically.—*W. J. Pudelkiewicz.* (Biological Abstracts)

ATKINSON, J. C., R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State U., State College.)
WEIGHT AND MOISTURE CONTENT OF CARCASSES FROM POULTS FED ADDED SODIUM CHLORIDE. *Poultry Sci. 33:* 656. 1954.—Carcass wt. and moisture content were detd. on 2 groups of White Holland poults at 25 days of age. One group was fed the Pennsylvania State University turkey starter without added NaCl while the other had received the same diet plus 2% added NaCl. Analysis of variance indicated that carcasses from poults fed the diet containing 2% added NaCl were highly significantly greater in wt. (11 g.) and moisture content (2.6%) than carcasses from poults on the control diet. Furthermore, the wt. differences were due entirely to moisture, carcass wts. on a dry matter basis being 23.2 and 23.7 g. for the 2% and no Nacl added diets, respectively.—*R. V. Boucher.* (Biological Abstracts)

ATKINSON, J. C., R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State U., State College.)
ANTIBIOTICS ALL THE WAY GAVE MORE POUNDS OF TURKEY. *Feed Age 3(7):* 41-42. 1953..—Three 100-bird lots of turkeys were fed: (1) College all-mash starter for 8 wks. then free choice of corn, oats, and wheat in addition to grower mash for 20 wks. (2) also 4.5 g. antibiotic/ton of feed the 1st 8 wks. (3) plus 4.5 g. antibiotic/ton of feed through both periods. At market time, group 3 was heaviest at 15.24 lbs., group 2 lightest at 14.25 lb., and group 1 intermediate at 14.46 lb. The differences were more pronounced with males than with all birds. Tests during the first 8 wks. with 900 White Holland poults showed that the greatest response from antibiotic came at the 9 g./ton level. Antibiotic was helpful, also, in improving the utilization of plant protein as a substitute for fish meal.—*A. W. Hofer.* (Biological Abstracts)

BALDINI, JAMES T., HANS R. ROSENBERG, and JAMES WADDELL. (Stine Lab., E. I. du Pont de Nemours and Co., Inc., Newark, Delaware.)
THE PROTEIN REQUIREMENT OF THE TURKEY POULT. *Poultry Sci. 33:* 539-543. 1954.—Three expts. with Jersey Buff turkey poults were conducted in battery brooders to 6 wks. Corn-soybean oil meal diets containing 20 and 28% protein were fed. When a 20% protein diet was supplemented with small amts. of lysine and methionine, growth and feed efficiency were equal to that obtained on a 28% protein diet. Protein efficiency was better on the lower protein diet. Methionine improved growth and feed efficiency when added to the 28% protein diet. This work suggests that amino acids may have an important role in the conservation of scarce protein for animal feeding. It also demonstrates that the turkey poult requires much less actual protein in its diet than was formerly assumed.—*J. T. Baldini.* (Biological Abstracts)

BARBORIAK, J., H. JUCKER, and E. CRASEMANN. (Inst. Haustiernährung, Tech. Hochsch., Zürich.) English summary.

UBER DIE WIRKUNG EINER ROHLEZITHINZULAGE BEI LEGEHENNEN. [EFFECT OF A SUPPLEMENT OF CRUDE LECITHIN FOR LAYING HENS.] *Arch. Geflügelk.*, 1953, *17*, 245-259.—In experiments at 2 centres with groups of White Leghorn pullets the addition of 4 per cent of crude lecithin to a normal laying mash had no effect on the health or bodyweight of the birds, on the percentage of white, yolk and shell in the eggs or on the percentage of lecithin in the yolk. There was a slight but not significant increase in egg production and feed utilization.—*W. Godden.* (Nutrition Abstracts and Reviews)

BENTLEY, ORVILLE G., and T. V. HERSHBERGER. (Ohio Agric. Expt. Sta., Wooster.)

THE EFFECT OF ANTIBIOTICS ON HATCHABILITY OF HENS' EGGS AND PROGENY GROWTH PERFORMANCE. *Poultry Sci. 33:* 641-648. 1954.—Three hatchability expts., each of from 16 to 20 weeks' duration were carried out using an all-plant breeder ration for hens. Progeny growth studies to determine the carry-over effect of the supplements in the maternal ration on progeny growth performance were also made. In addition, the vit. B_{12} content of day-old chick livers, egg yolks, and 6-wk.-old chick livers, as detd. with *L. leichmannii* ATCC 7830, was obtained. It was observed that: (1) Feeding antibiotics (bacitracin, Terramycin, Aureomycin-HCl, or procaine penicillin) to hens did not consistently improve hatchability of the fertile eggs. However, in one expt. there was some increase in hatchability with either bacitracin or Aureomycin-HCl, both in the presence and absence of supplmentary vit. B_{12}. (2) Bacitracin and probably Aureomycin-HCl, in the maternal diet appeared to exert a significant carry-over effect on the progeny growth if the antibiotics were added to a vit. B_{12} deficient ration. Little or no effect on progeny growth was observed when antibiotics were added to the vit. B_{12} supplemented hen ration, although there appeared to be a trend toward better growth performance in chicks from hens fed vit. B_{12} and procaine penicillin. (3) The level of vit. B_{12} in day-old chick livers, egg yolks, and hens' livers was not increased by feeding the antibiotics to hens. This would indicate that any carry-over effect from bacitracin or Aureomycin from the hen to the progeny was probably not mediated directly through the release of more vit. B_{12} from the egg yolk to the chick.—*Authors.* (Biological Abstracts)

BIRD, H. R. (U. Wisconsin, Madison.)

THE ROLE OF ANIMAL PROTEINS AND FATS IN POULTRY NUTRITION. *Feedstuffs 26(2):* 30-32, 54, 55, 57-58. 1954.—Slow-growing strains did not demonstrate need for unknown growth factors, whereas rapidly growing chicks, particularly males, required these factors for max. rate of growth. This was probably due to genetic differences in potential rate of growth. Meat meal and fish meal appeared to be very nearly equal in ability to supply unknown growth factors, about 5% of either seems to meet this need. Variability of meat meals was not studied. When the unknown growth factor was supplied, broilers averaged about 0.3 lb. heavier at 10 wks. than those that did not receive the factor. Other sources of the factor are yeast, fermentation products, and antibiotic residues. Fat improves texture and color of feeds, provides a vehicle for an antioxidant, reduces dustiness, and may increase the energy content. When fat was added to the diet of laying hens to increase the caloric content by 17%, feed efficiency was also increased 17%. Fat added to broiler rations did not increase rate of growth, but feed efficiency was improved.—*H. L. Wilcke.* (Biological Abstracts)

BISSETT, H. M., and H. L. A. TARR. (Pacific Fish. Exptl. Sta., Vancouver 2, B.C., Canada.)

THE NUTRITIVE VALUE OF HERRING MEALS. 2. THE EFFECT OF HEAT ON AVAILABILITY OF ESSENTIAL AMINO ACIDS. *Poultry Sci. 33:* 250-254. 1954.—The availability of essential amino acids in herring meal, as judged by comparative microbiological assays of chemical and enzymic hydrolysates, was not altered by the

normal flame drying commercial procedure, nor by heating air flow dried meal at 159° C for 30 to 60 min. in a rotating drum. Heating for 180 min. under these conditions impaired availability of all the essential amino acids, and with tryptophane, methionine, lysine, threonine and valine, more markedly so of February meals than in November meals. Since the deoxypentosenucleic acid and total pentose content of the February meals was greater than that of the November meals, it was suggested that Maillard reactions between liberated pentose sugars and amino acids were responsible for the observed differences.—*H. L. A. Tarr.* (Biological Abstracts)

CARVER, DONALD S., and ELTON L. JOHNSON. (Iowa State Coll., Ames.)

FURTHER STUDIES OF THE UNIDENTIFIED CHICK GROWTH FACTORS IN UNSATURATED FATS. *Poultry Sci. 3:* 543-548. 1954.—Unidentified growth factors in animal and vegetable fats have been studied as supplements to a semi-purified, "fat-free" diet. It was confirmed that wheat germ oil, corn oil, soybean oil, and oleic acid concentrate are sources of growth factors. Penicillin increased the utilization of high levels of corn oil, but depressed the growth of chicks receiving the 0.5% corn oil and "fat-free" diets. The saponifiable fraction of cottonseed oil possessed the major portion of its growth factors, but the non-saponifiable fraction was also growth-promoting. Commercially hydrogenated soybean oil in the form of oleomargarine did not contain much of the growth factor activity possessed by soybean oil. The unidentified factors in unsaturated fats were distinct from the growth factors present in liver fraction Biopar C. Biopar C improved growth only slightly. Pork liver residue, which contains 18.8% arachidonic acid of its total fatty acids, was a fair source of ether-soluble growth factors. Growth response from oral supplements of methyl linoleate, methyl linolenate and methyl oleate was inconsistent and rather small.—*Auth. summ.* (Bioogical Abstracts)

CHARKEY, L. W., W. K. MANNING, A. K. KANO, F. X. GASSNER, M. L. HOPWOOD, and I. L. MADSEN. (Dept. Chem., Colorado Agric. and Mech. Coll., Fort Collins.)

A FURTHER STUDY OF VITAMIN B_{12} IN RELATION TO AMINO ACID METABOLISM IN THE CHICK. *Poultry Sci.*, 1953, *32*, 630-642.—Day-old chicks of both sexes from hens depleted of vitamin B_{12} were given basal diets low in the vitamin, with soya bean protein or groundnut cake as source of amino-acids, and with or without a supplement of vitamin B_{12}. All birds were fasted for 48 hr. during the 4th week of the experiment to ascertain the effect of increasing the demand of the tissues for amino-acids. The thyroid glands and gonads were weighed to find whether vitamin B_{12} exerted its influence through them or not. Lysine, methionine, arginine, tryptophan and histidine were estimated microbiologically.

On the diet containing soya bean protein, growth, utilization of feed and response to vitamin B_{12} were greater than on the diet containing groundnut meal. The amino-acid content of the blood reflected the dietary intake of amino-acids, and the effect was discernible even after fasting, particularly with arginine and methionine. Vitamin B_{12} increased the blood value for arginine and methionine, but had no effect on that for lysine, tryptophan and histidine; the effect was independent of the diet given. In the conditions of the experiment the effect of vitamin B_{12} was not greater after fasting than before. Irrespective of previous diet, fasting reduced the blood values for arginine, methionine, tryptophan and histidine, but appreciably increased that for lysine. Lysine regained its original value within 4 hr. after food was given, and the values for the other amino-acids were higher than in the pre-fasting period.

None of the criteria associated with sex showed any difference dependent on the presence of vitamin B_{12}. The weight of the gonads and thyroid glands relative to bodyweight was reduced by fasting; total blood solids and thyroid iodine increased.—*E. M. Cruickshank.* (Nutrition Abstracts and Reviews)

CHARLET-LERY, G., A. C. FRANCOIS, and A. M. LEROY. 1953. (Inst. Nat. Rech. Agron., Paris.)
EFFET DE L'INGESTION DE PROTEINES IODEES SUR LA PONTE ET SUR LA TENEUR EN VITAMINE A DES OEUFS DE POULE. [THE EFFECT OF THE INGESTION OF IODINATED PROTEIN ON LAYING AND ON THE VITAMIN A CONTENT OF HEN'S EGGS.] *Ann. Zootech. [Paris], 2:* 159-161.—There was no appreciable difference in live weight, egg production or egg weight of the treated and control birds; the vitamin A content of the eggs of the former was lower. (Animal Breeding Abstracts)

CHIN, G., and A. W. BRANT. (Bur. Animal Indust., U.S. Dept. Agric., Beltsville, Md.)
EGG QUALITY AND AUREOMYCIN. *Poultry Sci.*, 1953, *32*, 875-876.—March-hatched Rhode Island Red pullets were transferred at 22 weeks of age from range to 6 houses of 40 birds each and were given a basal ration alone or with 5, 10, 20 or 40 p.p.m. aureomycin. Egg samples taken after 38 weeks and 55 weeks showed that incidence of blood or meat spots did not rise, nor did quality of white deteriorate.—*M. J. Head.* (Nutrition Abstracts and Reviews)

EBBELL, H. (Ovomaltine Farm, Oberwangen, Berne.) English summary.
DER EINFLUSS EINER BEIGABE VON METHIONIN UND EINES TERRAMYCIN-PRODUKTES AUF DAS KUKENWACHSTUM. [EFFECT OF SUPPLEMENTS OF METHIONINE AND A TERRAMYCIN PRODUCT ON THE GROWTH OF CHICKS.] *Arch. Geflügelk.*, 1953, *17*, 145-154.—Four groups of day-old chicks, 287 in all, were given an approved all-mash ration; one group acted as a control and the others had the ration supplemented with 0.15 percent *dl*-methionine or with 0.1 per cent of a vitamin B_{12}-terramycin concentrate given for 6 weeks to one group and 8 weeks to another. The birds were separated by sex after 6 weeks and the experiment terminated after 10 weeks.

The addition of methionine gave a growth response, as compared with the controls, of 2 per cent with the cockerels and 6.5 per cent with the pullets. The terramycin supplement for 6 weeks gave responses of 5 and 12 per cent, respectively, and no further benefit resulted from continuing the supplement for 8 weeks. In general the terramycin supplement gave more uniform birds, a better quality in the finished broiler and fewer rejects at six weeks.—*W. Godden.* (Nutrition Abstracts and Reviews)

ELAM, J. F., R. L. JACOBS, JEAN FOWLER, and J. R. COUCH. (Texas A. and M. Coll., College Station.)
EFFECT OF DIETARY CLOSTRIDIA UPON GROWTH-PROMOTING RESPONSES OF PENICILLIN. *Proc. Soc. Exptl. Biol. and Med. 85:* 645-648. 1954.—Growth rate of chicks was decreased by feeding *Clostridia* to chicks maintained in clean quarters where the *Clostridia* population was low. This growth depression was overcome by feeding penicillin. The feeding of *Clostridia* in old quarters where the *Clostridia* population was high failed to depress growth. Penicillin produced a significant growth response and decreased the *Clostridia* count/g. of feces in birds maintained in old quarters. Penicillin produced a growth stimulation only in cases where there was a decrease in the *Clostridia* count of the feces. It is concluded that penicillin stimulates growth by an action on the anaerobic *(Clostridia)* microflora.—*J. F. Elam.* (Biological Abstracts)

FANGAUF, R., and G. v. Barlowen. (Lehranst. Kleintierzucht, Kiel, Steenbek). English summary.
METHIONZUGABEN IM KUKENFUTTER. [SUPPLEMENTS OF METHIONINE IN CHICK RATIONS.] *Arch. Geflügelk.*, 1953, *17*, 269-273.—In continuation of previous work *(Deutsche Wirtschaftsgeflügelzucht*, 1952, 4, 149) 5 groups each of 30 day-old New Hampshire chicks were reared to 8 weeks on all-mash rations: (1) control, coarsely ground maize 30, ground wheat 30, wheat bran 15, alfalfa hay meal 3, dried yeast 3, cod fishmeal 8, soya grits 8, $CaCO_3$ 1.2, Ca phosphate

1.2, salt 0.6, Dohyfral extra A + D_3 0.02 per cent.; (2) methionine-low, the same except for the cereals, which were maize 20, wheat 15, barley 40 per cent; (3) the same with 0.15 per cent of DL-methionine; (4) methionine-low, maize 30, wheat 30, bran 13, cod fishmeal 4, soya grits 14, other items as in (1), with addition of 0.02 per cent of a vitamin B_{12} supplement containing 6 mg. vitamin B_{12} per lb. and 0.22 per cent of a penicillin supplement containing 2 g. penicillin G per lb.; (5) the same with 0.15 per cent of DL-methionine. The chicks were weighed and feed eaten was measured weekly.

The results are tabulated and weight gains are shown graphically. The final mean weights in g. were 620, 583, 584, 645, 716, respectively. It was concluded that the reduction of the fishmeal could be compensated for by supplements of vitamin B_{12} combined with methionine; the part played by penicillin is still open to question. The fact that methionine did not improve the barley ration indicates that poor growth on that ration was not due to the low methionine content of barley but to some substance present in barley.—*W. M. Deans.* (Nutrition Abstracts and Reviews)

GORDON, R. S., K. H. MADDY, and S. KNIGHT. (Monsanto Chem Co., Everett, Mass.)

VALUE OF METHIONINE HYDROXY ANALOGUE SUPPLEMENTATION OF BROILER RATIONS. *Poultry Sci. 33:* 424-425. 1954. —A 10-wk. growth study was made under carefully controlled environmental conditions to determine the ability of methionine hydroxy analogue (as the Ca salt of alpha-hydroxy, gamma-methylmercapto butyric acid) to improve performance of battery-raised New Hampshire Cockerels. Addition of 0.05% of methionine hydroxy analogue to each of 3 practical broiler rations significantly reduced the feed required/unit of gain.—*K. H. Maddy.* (Biological Abstracts)

HEYWANG, BURT W., and H. R. BIRD. (USDA, Southwest Poul. Expt. Sta., Glendale, Arizona.)

THE EFFECT OF ALFALFA SAPONIN ON THE GROWTH, DIET CONSUMPTION, AND EFFICIENCY OF DIET UTILIZATION OF CHICKS. *Poultry Sci. 33:* 239-241. 1954.—Diets containing 0, 0.05, 0.10, 0.20, or 0.40% of saponin extracted from alfalfa were fed to groups of 10, day-old New Hampshires until they were 6 wks. old in 2 expts. In the 2d expt. 1 diet also contained 0.15% of the saponin. Results show that the saponin in alfalfa inhibits growth, diet consumption, and efficiency of diet utilization of chicks. The lowest level at which there was an unmistakable inhibition of growth was 0.20%; the effect was greater at a saponin level of 0.40%. Data do not show whether saponin is the only responsible component of alfalfa.—*B. W. Heywang.* (Biological Abstracts)

HILL, C. H., and J. W. KELLY. (Dept. Poultry Sci., Univ. N. Carolina, Raleigh.)

THE EFFECT OF ANTIBIOTICS ON THE GROWTH OF CHICKS RAISED IN NEW QUARTERS. *J. Nutrition,* 1953, *51,* 463-466.—In a series of trials New Hampshire chicks from a commercial hatchery were grouped in wire-floored pens in a battery house not previously used for poultry, and were fed from day-old to 4 weeks of age on a control ration made up of soya bean meal 30, fishmeal 3, dried whey 3, alfalfa meal 3, methionine 0.2, vitamins, minerals and yellow maizemeal to 100.

In the first trial the group fed on the control ration had a mean weight of 375 g. at 4 weeks, and that of a parallel group receiving the same ration supplemented with 22 p.p.m. crystalline aureomycin hydrochloride was not significantly different.

In the second trial the same cages were used, and only the dropping pens had been washed out. Again, a group receiving 22 p.p.m. aureomycin in their ration was no heavier than a control group; but a third group receiving 220 p.p.m. aureomycin was 10 per cent heavier.

The same was found in a third trial with these 3 treatments in old, steam-sterilized cages in a new building.

It is concluded that a growth response may be obtained with chicks, even in new buildings and with new equipment, if large amounts of an antibiotic are given, and even though no response is obtained with amounts that give a response under farm conditions. It is suggested that organisms responsible for decreasing the growth rate of chicks reared in new quarters may be more resistant to antibiotics than corresponding growth-retarding organisms met by chicks placed in quarters previously used.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

HILL, C. H., and J. W. KELLY. (North Carolina State Coll., Raleigh.)
THE EFFECT OF FISH MEAL ON THE RESPONSE OF CHICKS TO HIGH LEVELS OF PENICILLIN. *Poultry Sci 33:* 657-658. 1954.—In clean quarters chicks failed to respond in growth to high levels of antibiotics unless fish meal was present in the ration.—*C. H. Hill.* (Biological Abstracts)

HOLLENBECK, C. M., W. E. DANNER, and J. F. MAHONEY.
THE STABILITY OF PROCAINE PENICILLIN IN FEEDS. *Poultry Sci. 33:* 425-427. 1954. (Biological Abstracts)

JENSEN, L. S., G. F. HEUSER, M. L. SCOTT, and L. C. NORRIS. (Cornell Univ., Ithaca, N. Y.)
THE EFFECT OF VITAMIN E AND NIACIN IN THE NUTRITION OF TURKEY BREEDER HENS. *Poultry Sci.*, 1953, *32*, 907. (Nutrition Abstracts and Reviews)

KALLAI, L. and U. P. KRALOVANSZKY.
HUNGARIAN COBALAMIN-CONTAINING PRODUCTS ON LARGE SCALE POULTRY-REARING- AND FATTENING-FARMS. [HAZAI KOBALAMINTARTALMU KESZITMENY HAZI SZARNYASAINK NAGYUZEMI NEVELESEBEN ES HIZLALASABAN.] *Allattenyesztes*, Budapest, 1954. 1, pp. 79-88.—The authors made examinations with cobalamin preparations produced by them from cattle-excrements, at the Department of Physiology and Nutrition of the Research Institute for Animal Husbandry. On two farms of the Ministry of Food, they supplemented their laboratory experiments so far made, by practical examinations on a larger basis, enabling the large scale poultry rearing and fattening farms to establish the effectiveness of the products, under conditions prevailing on the farms.

In the course of these, 240 chicks reared in batteries, reached within a 10 weeks experimental period the following weight: experimental group —755.4 g.; control group—714.4 g.

The more favorable feather development of the experimental group was striking. The authors made fattening experiments on 180 yellow Hungarian, barred Hungarian and white Leghorn cocks. The percentual weight increase as related to the starting weight, was on an average 5.1% higher on the experimental group receiving 50 microgram cobalamin to each food-kilogram. During further experiments they studied the influence of the different cobalamin rations: in case of 25 microgram cobalamin per food-kilogram a 6.8% surplus, in case of 75 microgram, a 2.0% surplus was established in the rate of the percentual weight-increase, as related to the average starting weight. Finally, a weight-increase more favorable by 5.8% was obtained by experiments made with machine cramming on 60 fattening ducks of Peking type than with the control individuals. In the course of the trial slaughter the data of the chemical analysis of the meat and liver showed no characteristic difference. (Hungarian Agricultural Review)

KRUGER, L., G. SEEFELDT, and E. LOTHE. (Inst. Tierzucht, Justus Liebig Hochsch., Giessen.) English summary.
KUKENAUFZUCHTVERSUCHE MIT "ENTAN" UND "FORTRACIN". [CHICK REARING EXPERIMENTS WITH "ENTAN" AND "FORTRACIN".] *Arch. Geflügelk.*, 1953, *17*, 274-284.—In the first experiment, 3 groups of 37 Leghorn cockerels were fed in batteries from 8 days to 9 weeks. For the first 5 weeks group 1 had a normal ration of coarsely ground barley, maize and milo each 20, fishmeal 22, dried skimmed milk 6, dried yeast 3, alfalfa meal 3, calcium carbonate 4 and

wood charcoal 2 per cent, group 3 the same with 0.5 per cent. Entan, a preparation of vitamin B_{12} and terramycin, replacing the same amount of milo, and group 2 the same as group 3 except that half the fishmeal and half the dried milk were replaced weight for weight by soya grits. For the last 3 weeks group 1 had ground barley 5, maize 10, milo 20, wheat 25, groundnut meal 5, malt sprouts 5, meatmeal 8, herringmeal 5, dried skimmed milk 3, alfalfa meal 5 and other items as before, group 3 the same with 0.5 per cent. Entan replacing maize, and group 2 the same as group 3 with half the animal protein replaced by groundnut meal 4, malt sprouts 3 and dried yeast 1 per cent. The chicks were weighed and feed eaten was recorded weekly and the results are presented in tables and graphically.

Group 2 gained as well as group 1 and showed less of a check in growth when the ration was changed; feed utilization was slightly better and feed cost less. On the other hand, no advantage resulted from addition of Entan to a ration containing a normal amount of animal protein.

In the second experiment 2 groups each of 40 cockerels were fed from 14 days to 10 weeks on a ration of ground barley 22, maize 13, milo 20, soya grits 20, dried yeast 3, dried skimmed milk 3, fishmeal 11, alfalfa meal 3, wood charcoal 2, calcium carbonate 1.95 and calcium phosphate 1.05 per cent, or the same with 0.3 per cent. Fortracin, a preparation of bacitracin, replacing ground maize

The group with Fortracin made poorer gains, although towards the end they tended to catch up, and feed intake was slightly greater. Whether Fortracin would be of benefit when added to a ration with half the animal portein, or in conjunction with vitamin B_{12}, remains to be seen.—*W. M. Deans.* (Nutrition Abstracts and Reviews)

LEME DA ROCHA, G., and H. F. FRANCISCO RAIMO. (Div. Zootec. Nutricao Animal.) English summary.

CONTRIBUICAO AO ESTUDO DOS SUBSTITUTOS DOS FARELOS DE TRIGO NA ALIMENTACAO DAS AVES. 2. GUANDU. [SUBSTITUTES FOR WHEAT PRODUCTS IN POULTRY FEEDING. 2. PIGEON PEAS.] *Bol. Indust. animal, Sao Paulo,* 1952, *13,* 119-129.—A ration containing 35 percent of wheat products (bran plus middlings) served as control and the test ration was identical except that the wheat products were entirely replaced by pigeon pea *(Cajanus cajan)* flour. Groups of 45 New Hampshire chicks were used and the experiment lasted from birth to 30 weeks of age.

At 14 weeks the test group had an average live-weight of 1263.5 g. and the controls of 1384.8 g. The 2 groups had consumed on the average 7001.0 g. and 7463.9 g. feed, respectively. No significant difference in body conformation or feathering was noted between the 2 groups. From 14 to 30 weeks of age the test group ate less feed than the controls and finished at the same average liveweight. Sexual maturity was delayed about 6 days in the test birds compared with controls. A 48-day egg laying test showed that the test birds laid 7.64 per cent more eggs than the controls.

It was concluded that pigeon pea flour is suitable for poultry—*P. C. Jowsey.* (Nutrition Abstracts and Reviews)

LEVINE, P. P. (New York State Vet. Coll., Ithaca, N. Y.)

MEDICANTS IN FEED. *Amer. Miller and Processor 82(1):* 76-77. 1954.—Since the only practicable way of medicating large numbers of chickens economically is in the ration, the feed industry is forced to act as a dispensing pharmacist. The industry must assume the same obligations that the ethical pharmacist has to the public, that is, for purity and potency of drugs used, proper compounding of prescriptions, careful review of dosage to prevent poisoning. Specific medication will be effective only when the diagnosis is accurate. The recent demonstrations of the unfavorable effect of 2-amino-5-nitrothiazole on the reproductive tracts of chickens medicated over a period of time is a case in point. The palatability and healthfulness of poultry meat and eggs originated from medicated poultry for humans cannot be overlooked. Antibiotic medications sold to dairy farmers and used promiscuously have been sharply criticized when detectable amts. were found in the milk. Were it not

for the fact that high concns. of antibiotics are so costly, even more generous use of these substances would be made by poultrymen.—*H. G. Obermeyer.* (Biological Abstracts)

LILLIE, ROBERT J., and J. R. SIZEMORE. (U.S. Dept. Agric., Beltsville, Maryland.)

EFFECT OF ANTIBIOTIC ON EGG PRODUCTION OF NEW HAMPSHIRES. *Poultry Sci. 33:* 427-429. 1954.—New Hampshire pullets were fed an all-vegetable protein diet low in vit. B_{12} for 7 lunar mos. The birds were then segregated into 2 groups, namely, a low producing group and a high producing group, on the basis of the 7-lunar mo. egg production data. Incorporation of a vit. B_{12}-antibiotic feed supplement definitely improved egg production of the low producer but not that of the high producers.—*R. J. Lillie.* (Biological Abstracts)

LINDBLAD, G. S., S. J. SLINGER, and I. MOTZOK. (Ontario Agric. Coll., Guelph, Canada.)

EFFECT OF AUREOMYCIN ON THE CALCIUM AND PHOSPHORUS REQUIREMENTS OF CHICKS AND POULTS. *Poultry Sci. 33:* 482-491. 1954.—Expts. were made to study the influence of Aureomycin on the Ca and P requirements of chicks and poults. Aureomycin improved chick and poult wt. in all cases. The more inadequate the ration in Ca and P the greater was the percentage increase in wt. due to the antibiotic. Under the conditions of these expts. and on the basis of the Ca and P levels employed, the antibiotic did not appear to alter the requirement of female chicks but it seemed to increase the requirement of male chicks, for P. The Ca and P requirements of female poults were not appreciably altered by the addition of Aureomycin to the diet. However, significant interaction was shown between P and sex, suggesting that male poults have a higher requirement for inorganic P than the generally recommended levels of 0.4%. This may be due to the fact that the interaction between antibiotic and sex was highly significant ($P<0.01$) in favour of the male poults. Aureomycin improved the feed efficiency of chicks and poults. In the presence and absence of Aureomycin in the diet, when the level of Ca was raised above 1.0 and 2.0% for chicks and poults, respectively, the efficiency of feed utilization was decreased.—*S. J. Slinger.* (Biological Abstracts)

McFARLAND, W. (Dept. Biochem., Pennsylvania State Coll., State College.)

EFFECT OF HIGH PYRIDOXINE INTAKE IN CHOLESTEROL-FED CHICKS. *Arch. Pathol.*, 1953, *55*, 503-505.—In an experiment with 24 cockerels 5 weeks of age, a mash diet was supplemented with 1 per cent of cholesterol, alone or with 16 or 80 mg. pyridoxine per lb. diet. The presence of pyridoxine did not reduce the blood cholesterol and when the birds were killed after 5 months the atherosclerotic lesions were more severe in those which had had pyridoxine than in those without.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

MACHLIN, L. J., P. B. PEARSON, C. A. DENTON, and H. R. BIRD. (Bur. Anim. Indus., U.S. Dept. Agric., Beltsville, Md.)

THE UTILIZATION OF SULFATE SULFUR BY THE LAYING HEN AND ITS INCORPORATION INTO CYSTINE. *J. Biol. Chem.*, 1953, *205*, 213-219.—Laying hens were given ^{35}S as sulphate by mouth or vein. Radio-active S was found in the white and yolk of the eggs laid, the peak concentrations occurring 3 or 4 days after administration. The method of administration made little difference to the quantities present in the eggs. About 35 per cent of the ^{35}S in the eggs was non-sulphate or "organic" S; a higher proportion of this was in the white than in the yolk. Cystine was labelled, but not methionine. —*R. Hill.* (Nutrition Abstracts and Reviews)

MACHLIN, LAWRENCE J. (U.S. Dept. Agric., Beltsville, Md.)

METHIONINE METABOLISM IN THE LAYING HEN. 1. EFFECT OF CHANGE IN THE DIETARY PROTEIN OR TRYPTOPHAN LEVEL ON DEPOSITION OF S^{35} IN THE EGG. *Poultry Sci. 33:* 201-205. 1954.—Deposition of S^{35} in eggs, after injn. of S^{35}-labeled

methionine into laying hens was detd. Max. activity was observed in the albumen 3 days and in the yolk 6 days after admn. of radioactive methionine. Compared to controls, a reduction in dietary level of protein or tryptophan 11 days after injn. of radioactive methionine resulted in a relative increase in the deposition of S^{35} in the egg albumen.—*L. J. Machlin.* (Biological Abstracts)

MAGRUDER, N. D., J. K. BLETNER, T. B. CLARK, and C. E. WEAKLEY, JR. (West Virginia U., Morgantown.)
THE VARIABLE RESPONSE OF NORMAL CHICKS TO STRESS RATIONS AND A VITAMIN B_{12} SUPPLEMENT. *Poultry Sci. 33:* 511-518. Illus. 1954.—The efficacy of stress rations for depleting chicks of vit. B_{12} was studied. The dams of the chicks were New Hampshire pullets that were fed normal rations and housed on unchanged litter. The response of the chicks to the stress and vit. B_{12} supplemented rations varied between hatches. Growth was retarded most severely by the 70% soybean oil meal ration containing 0.1% iodinated casein, followed in order by the 70% soybean oil meal ration and the 35% soybean oil meal ration containing 0.1% iodinated casein. The vit. B_{12} supplement improved feed efficacy. Mortality was low except in the lots fed the iodinated casein. A faulty feather structure and a white barring in the primary and secondary wing feathers and the main tail feathers was accentuated by the 70% soybean oil meal ration and could not be prevented by the addition of folic acid, vit. B_{12} supplement, or a combination of the two. Iodinated casein at the 0.1% level produced an increased melanism in both the surface and undercolor of the feathers. —*J. K. Bletner.* (Biological Abstracts)

MARCH, B. E., M. BURDETT, and JACOB BIELY. (U. British Columbia, Vancouver.)
ANTIBIOTICS AND SURFACE ACTIVE AGENTS IN CHICK NUTRITION. *Poultry Sci. 33:* 300-304. 1954.—Expts. were conducted to study the effect on growth of supplementing chick starting rations with Tween-80 and Santomerse-80 (polyoxyethylene sorbitain monooleate and an alkyl aryl sulfonate, respectively). Both compounds stimulated growth in some rations but not in others. Response of chicks on a folic acid deficient diet to surface active agents and antibiotics was discussed. In no instance was the response to a surface active agent as great as that obtained by supplementation of a similar diet with an antibiotic. Stimulation as a result of feeding the surface active agents was apparent by the time the chicks were 4 wks. old. Some differences in response to the surface active agents appeared to be due to composition of the diet fed.—*Authors.* (Biological Abstracts)

MILLER, O. N. (Dept. Biochem., Univ. Texas Med. Branch, Galveston.)
AN UNRECOGNIZED NUTRITIONAL FACTOR (CORNSTARCH) REQUIRED BY THE DUCK. *J. Nutrition, 50:* 13-22. 1953. —Thirty-one newly hatched ducklings were housed in cages with raised screen floors and fed on a ration of casein 18, gelatine 10, maize oil 10, cellulose 4, minerals 5, vitamins A, B_1, B_6, D, E, and K, biotin, Ca pantothenate, folic acid, nicotinic acid and riboflavin, and maize starch to 100. At 32 days of age the birds had a mean weight of 990 g., and were of good general appearance. Birds fed on the same ration with sucrose replacing maize starch weighed 780 g. and appeared less healthy.

Both groups were killed, and at post-mortem examination 21 per cent of the maize starch group showed lesions of pancreatic fibrosis, and 87 per cent of the sucrose group.

In further trials neither vitamin B_{12} with inositol nor methionine was of value in preventing the onset of the condition in the birds receiving sucrose. The addition of 10 per cent of maize starch was sufficient to prevent its appearance, and sugar refiner's "mud" was partly effective at low levels.

It is considered possible that the active material in commercial maize starch may be identical with Schwarz's "factor 3" (Abst. 1037, Vol. 22), which has been reported to be present in some strains of yeast and to prevent liver necrosis in young rats.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

MORGAN, CHARLES L., and C. P. WILLIMON. (South Carolina Agric. Expt. Sta., Clemson.)

COTTONSEED MEAL PREPARED BY DIFFERENT METHODS FOR BROILER RATIONS. *Poultry Sci. 33:* 528-532. 1954.—Cottonseed meals prepared by the hydraulic, screw-press, and degossypolized solvent extraction methods were used in broiler rations alone and in combination with soybean meal to supply equal amts. of protein. In comparison with a soybean supplemented ration all combinations of the various types of cottonseed meal with soybean meal and supplemented with limited quantities of fish meal and dried whey, various vits., minerals and methionine produced satisfactory gains in broilers to 10 wks. of age. The degossypolized solvent extracted cottonseed meal as the sole protein supplement gave growth rates significantly equal to those obtained with soybean meal. The hydraulic and screw-press meals, when used as the sole source of protein, produced growth rates significantly less than those obtained with soybean meal.—*C. L. Morgan.* (Biological Abstracts)

MORRISON, A. B., W. G. HUNSAKER, and J. R. AITKEN. (Central Exptl. Farm, Ottawa, Canada.)

INFLUENCE OF ENVIRONMENT ON THE RESPONSE OF CHICKS TO GROWTH STIMULANTS. *Poultry Sci. 33:* 491-494.1954. Four growth stimulants, procaine penicillin, 10 g./ton), 3-nitro-4-hydroxyphenylarsonic acid (90 g./ton), arsanilic acid (90 g./ton) and ethomid C/15 (2 lbs./ton) were fed to chicks in 2 different environments. In 1 environment the chicks were reared on wire in newly purchased battery brooders located in a disinfected and freshly painted house. In the other environment the chicks were raised on a litter in close proximity to older stock. A total of 1,000 chicks were used in the test. Two groups of 50 chicks each were allotted to each treatment and a control in each environment. The growth data were analyzed statistically by the method of analysis of variance. A highly significant effect of environment on growth rate was observed. Procaine penicillin increased growth at both 4 and 6 wks. of age in the old environment, but not until 6 wks. of age and by a lesser amt. in the new environment. 3-nitro-4-hydroxyphenylarsonic acid increased growth at 6 wks. of age in the old environment but had no effect in the new environment. Arsanilic acid and ethomid C/15 were without effect in either environment.—*J. R. Aitken.* (Biological Abstracts)

MOURIQUAND, G., J. ROLLET, and V. EDEL.

SUR LES CONDITIONS D'APPARITION DES MANIFESTATIONS OCULAIRES DE L'AVITAMINOSE A DU PIGEON. [CONDITIONS PRODUCING OCULAR MANIFESTATIONS OF VITAMIN A DEFICIENCY IN THE PIGEON.] *C.R. Soc. Biol, 147:* 706-708. 1953.—Pigeons kept on a diet of polished rice supplemented with vitamin B_1 for from 70 to 300 days developed eye lesions due to deficiency of vitamin A. The eyes became dull with encrusted lids, and the feathers were lost from the area round the eyes. The lesions could be cured by giving vitamin A in various forms.—*T. Moore.* (Nutrition Abstracts and Reviews)

MULLER, W.

ZULAGE VON ANTIBIOTICA-PRAPARATEN ZU EINER HANDELSUBLICHEN MASTMISCHUNG FUR HAHNCHEN. BERICHT UBER EINEN AUF VERANLASSUNG DER VEREINIGUNG SCHWEIZ. FUTTERMITTELFABRIKANTEN (VSF) IM PARC AVICOLE COPPET (BESITZER: *H. Séquin*) DURCHGEFUHRTEN VERSUCH. [ADDITION OF ANTIBIOTIC PREPARATIONS TO A COMMERCIAL FATTENING MEAL FOR COCKERELS. REPORT ON AN EXPERIMENT MADE IN THE PARC AVICOLE COPPET (PROPRIETOR H. SEQUIN) AT THE REQUEST OF THE SWISS FEEDING-STUFFS FANUFACTURERS ASSOCIATION (VSF).] *Arch. Geflügelk., 17:* 201-208. 1953. English summary.—The antibiotics used were terramycin, penicillin, aureomycin, terramycin plus penicillin and aureomycin plus penicillin. Four groups of 20 cockerels, 7 weeks old, were used for each supplement to a standard ration and 4 groups served as a control. The feeding lasted for 26 days. All the antibiotics improved

growth rate and feed efficiency; terramycin gave the best results. When mixtures of antibiotics were used there was no evidence of any additional effect. Allowing for the cost of the antibiotics the improved efficiency reduced the feed costs per kg. gain by 6 to 15 per cent compared with that of the control groups.—*W. Godden.* (Nutrition Abstracts and Reviews)

MUSSEHL, F. E., and C. W. ACKERSON. (Nebraska Expt. Sta., Lincoln.) BROILER CHICKS NEED MORE D_3. *Feedstuffs 26(17):* 64-65. 1954.—When a broiler ration with a Ca:P ratio of 1.9 to 1 was used as a base, broiler chicks required somewhat more than 300 I. Chick U. of vit. D_3/lb. of ration for normal calcification. Increases to 1200 I.C.U./lb. of ration produced no deleterious results.—*H. L. Wilcke.* (Biological Abstracts)

MUSIL, F., and V. KOZELUHA. (Agricultural Research Institut Brno, Czechoslovakia)
APF AND ITS INFLUENCE UPON THE HATCHABILITY OF HEN EGGS. [ZBF A JEHO VLIV NA LIHNIVOST, ZIVOTNOST A RUST KURAT.] *Nás. Chov, 24:* 117-123. 1949.—The authors studied the influences upon the hatchability of hen eggs. The eggs produced by hens, that had access to the dung hill containing cow manure had during February a better hatchability by 32.9 - 42.4% than eggs from hens that were kept without the access to cow manure. In the spring and summer months when hens had a run to the gardens the hatchability was higher but that from hens with access to cow manure was always higher.—*V. Orel*

NEY, L. F., and G. W. NEWELL. (Stanford Res. Inst., Calif.)
THE EFFECT OF A SODIUM ALKYL ARYL SULFONATE DETERGENT ON THE GROWTH OF CHICKS. *Poultry Sci. 33:* 297-299. 1954.—A Na alkyl aryl sulfonate detergent was added to the diet of a meat-producing breed of chicks at levels of 0.5, 1.0, and 2.0 g. of active material per kg. of diet. Greater wt. gains were observed over a 12-wk. test period than were made by controls on an unsupplemented basal diet. Effects on growth and feed efficiency was compared with that of aureomycin and penicillin fermentation residues, and a phenylarsonic acid supplement. All of the supplemented groups showed greater wt. gains and more efficient utilization of feed than did the control group. Supplements of antibiotic fermentation residues showed greater effects during the 1st 4 wks., but were eqalled by the detergent supplements over the full term of the expt.—*Authors.* (Biological Abstracts)

NORRIS, L. C., H. M. EDWARDS, JR., and D. CHIN. (Cornell U., Ithaca, N.Y.)
UNIDENTIFIED VITAMINS. *Flour and Feed. 54(7):* 8-9. 1953.—Two unidentified factors (or groups of factors), when added to basal chick rations containing adequate quantities of all known vits., essential amino acids and minerals, caused wt. increases over the basal groups of 36 to 50%. One of these factors is provided by fish solubles and penicillin mycelia while the other is contributed by distiller's solubles and dried liver.—*M. J. Blish.* (Biological Abstracts)

O'NEIL, J. B., and J. M. BELL. (U. Saskatchewan, Saskatoon, Canada.)
"FEED-ANI" AS A RATION COMPONENT FOR POULTRY AND LIVESTOCK. *Canadian Jour. Agric. Sci. 34:* 36-40. 1954.—A commercial product bearing the trade name "Feed-Ani" was fed at the rate of 2% to growing chicks and growing mice that were fed commercial chick starter mashes and growing-swine rations, respectively. The growth of the chicks and their relative growth efficiencies were depressed by an amt. approximating the dilution with "Feed-Ani." In the mouse-feeding trials, "Feed-Ani" increased feed consumption by an avg. of 13% of all diets tested, but in no instance did it improve gains in wt. The use of "Feed-Ani" led to a significant decrease in feed efficiency.—*Authors.* (Biological Abstracts)

OPDYKE, DAVID F., and WALTHER H. OTT (Merck Inst. Therapeutic Res., Rahway, N. J.)
INFLUENCE OF SOURCE OF CHOLESTEROL, GRADE OF

COTTONSEED OIL, AND BREED ON EXPERIMENTAL AVIAN ATHEROSCLEROSIS. *Proc. Soc. Exptl. Biol. and Med. 85:* 414-415. 1954.(Biological Abstracts)

PEPPER, W. F., S. J. SLINGER, and J. E. BERGEY. (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF 3-NITRO 4-HYDROXYPHENYL ARSONIC ACID ON THE GROWTH AND SEXUAL MATURITY OF PULLETS. *Poultry Sci. 33:* 422-423. 1954.—The inclusion of 3-nitro 4-hydroxyphenylarsonic acid in diets for birds reared on litter and receiving 4 g. of procaine penicillin G/ton of feed resulted in increased growth and feed efficiency at 20 wks. of age. Each group was comprised of 197 Columbian Plymouth Rock females at the start and there was no difference in mortality attributable to the treatment. Egg production records indicated a trend towards earlier sexual maturity for birds receiving the drug.—*S. J. Slinger.* (Biological Abstracts)

RASK-NIELSEN, R., and E. BENNETT. (Fibiger Lab., Inst., Pathol. Anat., Univ. Copenhagen.)
INVESTIGATIONS INTO THE EFFECT OF THYMONUCLEIC ACID FED TO FOLIC ACID DEFICIENT CHICKS BEARING ROUS SARCOMAS. *Acta pathol. microbiol. scand., 32:* 367-374. 1953.(Nutrition Abstracts and Reviews)

REID, B. L., J. F. ELAM, and J. R. COUCH. (Texas A and M Coll. System, College Station.)
THE EFFECT OF ORAL AND PARENTERAL ADMINISTRATION OF ANTIBIOTICS ON GROWTH AND FECAL MICROFLORA IN THE TURKEY POULT. *Poultry Sci. 33:* 307-309. 1954.—Growth increase was obtained by the addition of Aureomycin, penicillin, bacitracin, and chloromycetin to an all-vegetable protein diet for turkey poults. Parenteral admn. of Aureomycin produced an increase in growth and a change in fecal microflora. This might indicate an excretion of Aureomycin into the intestinal tract of the bird. Injn. of bacitracin or penicillin failed to produce a change in growth rate or exert an effect on the fecal microflora under the conditions of this expt. Chloromycetin when injd. produced a change in fecal microflora, but failed to increase growth at the level tested.—*B. L. Reid.* (Biological Abstracts)

ROSENBERG, M. M. (U. Hawaii, Honolulu.)
AN EVALUATION OF B-GRADE MOLASSES IN CHICK STARTER RATIONS. *Poultry Sci. 33:* 382-389. 1954.—In 3 trials involving 720 day-old New Hampshire chicks, concns. of B-grade molasses-bagasse pith (5:1 by wt.) were fed at levels ranging from 0 to 54% of total ration. Results of these studies were evaluated on the basis of growth rate, efficiency of feed conversion, and livability of the exptl. chicks to 42 days of age. When the "molasses-mix" was substituted directly for yellow corn meal without correcting the rations for total protein, the net gain of chicks fed the molasses mix at 13.5, 27.0, 40.5, and 54.0% of total ration was 98.3, 97.7, 92.1, and 77.5% that of the controls, respectively. All these rations were significantly less efficient than the control ration. Upon balancing the total protein of the exptl. rations, it was found that a ration containing 40% molasses-mix of total ration supported growth 101.9% as well as the control with an equally good feed conversion index. However, efficiency of feed conversion was significantly impaired at 48% molasses-mix, although chicks fed this ration grew 96.4% as rapidly as the control. At each of 4 concns. of B-grade molasses, ranging from 23 to 46% of total ration, chicks fed reduced levels of bagasse pith grew faster and, in 3 comparisons, more efficiently than corresponding lots fed bagasse pith in the ratio of 1 part pith to 5 parts of B-grade molasses, by wt. These chicks, receiving 23.0, 29.5, 37.0, and 46.0% B-grade molasses of total ration, respectively, gained 4.5, 4.6, 3.4, and 4.6% more wt. than did their controls. Results of trials 2 and 3 show that B-grade molases is a valuable carbohydrate feedstuff for poultry, particularly when the importation of cereal grains to grain deficient areas is curtailed either by shipping strikes or gov-

ernment edict. Its use may be greatly enhanced, even under less trying circumstances, when the comparative prices of cereal grains and B-grade molasses are such as to make this sugar by-product the preferred feedstuff.—*M. M. Rosenberg.* (Biological Abstracts)

ROSS, ERNEST, and HAROLD YACOWITZ. (Ohio State U., Columbus.) EFFECT OF PENICILLIN ON GROWTH AND BONE ASH OF CHICKS FED DIFFERENT LEVELS OF VITAMIN D AND PHOSPHORUS. *Poultry Sci. 33:* 262-265. 1954.—Using New Hampshire chicks, dietary procaine penicillin G significantly increased tibia ash in the presence of 8-600 I.C.U. of vit. D/100 g. of feed. Penicillin had no effect on the vit. D requirement for growth nor did it stimulate growth in chicks fed a vit. D deficient, low P ration. A direct relationship existed between the amt. of fat in the tibia and the amt. of vit. D fed. Penicillin further increased the tibia fat except when vit. D was suboptimal.—*Authors.* (Biological Abstracts)

SANFORD, PAUL E., ALICE J. WEI, and ROBERT E. CLEGG. (Kansas State Coll., Manhattan.) VITAMIN C AND TYROSINE METABOLISM IN THE CHICKEN. *Poultry Sci. 33:* 585-589. Illus. 1954.—Groups of chicks were fed a typical chick starter diet supplemented with 0, 2.5, 5.0, 7.5 and 10.0% tyrosine from time of hatching to the age of either 3 or 4 wks. Two very definite effects were observed. First, the chicks fed 5.0, 7.5 and 10.0% tyrosine supplements grew at a much slower rate, and 2d the chicks fed 7.5 and 10.0% supplements showed a high mortality and developed a definitely abnormal feather condition. The feathers were ragged, stunted and chalk white in appearance. When ascorbic acid was present in the diets high in tyrosine, these effects were almost completely eliminated. The effect of induced ascorbic acid deficiency with adult hens maintained on a commercial ration supplemented with 7 g. of tyrosine daily revealed no definite trend in the tyrosyl value. However, both the homogentisic acid and keto acid value remained low for a period of at least 12 days and then rose rather abruptly. When ascorbic acid was fed. in addition, these values returned to the previous low values.—*P. E. Sanford.* (Biological Abstracts)

SAUBERLICH, H. E., and A. E. SCHAEFER. (Alabama Polytech. Inst., Auburn.) STUDIES ON AMINOPTERIN, LEUCOVORIN AND FOLACIN WITH THE CHICK. *Poultry Sci. 33:* 107-111. 1954.—Studies were made on comparative effectiveness of folacin and leucovorin (synthetic citrovorum factor) for growth and reversal of aminopterin toxicity. Leucovorin appeared inferior to folacin in the chick nutrition. Aminopterin (5 to 20 mg./kg. of diet) was very toxic to chicks; the toxic effects could be counteracted largely by high amts. of either folacin or leucovorin. Folacin and leucovorin appeared to possess approx. equal activity in this respect. Aureomycin and penicillin were ineffective in preventing the toxic effects of aminopterin. The antibiotics appeared to depress the growth of chicks fed a folacin-deficient diet but improved growth in the presence of folacin. Aminopterin caused a slight decrease in the ascorbic acid concn. of chick liver, which was corrected by injns. of folacin or leucovorin.—*Auth. summ.* (Biological Abstracts)

SHIRLEY, R. L., J. C. DRIGGERS, J. P. FEASTER, J. T. McCALL, and G. K. DAVIS. (U. Florida, Gainesville.) EFFECTS OF MASSIVE DOSES OF P^{32} AND Ca^{45} ON LAYING HENS. *Poultry Sci. 33:* 612-615. 1954.—Laying hens which had received intramusc. about 2.0 mc. (millicurie) of P^{32} in several small doses during Aug., Sept. and Nov., as well as single 4.0 and 6.0 mc. doses during the following Jan. and Mar. survived but succumbed 11 to 12 days after dosage upon receiving an 8.0 mc. dose during Apr. Corresponding hens that received about 3.0 mc. of Ca^{45} during Nov. and Dec., 5.0 mc. in Jan., 3.5 mc. in May, and 8.0 mc. during Aug. showed no adverse effect of the isotope during a 2 yr. period following dosage. The bones of the hens that succumbed to the P^{32} radiations had

about 100 to 500 rep./day/g. and the soft tissues one-tenth to one-fourth this concn. The Ca^{45} had no observed effect on any of the blood cells, and the P^{32} had no effect on the total red and white cell counts. However, in the case of the hens that received the P^{32} no monocytes or neutriphiles were detected during the 3 wks. previous to their death, and the eosinophiles and basophiles were only occasionally observed during this period.—*R. L. Shirley.* (Biological Abstracts)

SINGSEN, E. P., R. H. MATTERSON, ANNA K. BUNNELL, and E. L. JUNGHERR (U. Connecticut, Storrs.)

VITAMIN E REQUIREMENTS OF CHICKENS. *Flour and Feed 54(7):* 9-11. 1953.—Encephalomalacia frequently occurs in very young chicks when the maternal ration contains vit. A and D oil at a 2% level, unless the ration also contains vit. E in adequate amt. The antioxidant diphenyl-para-phenylenediamine (DPPD) also has unique protective action against encephalomalacia.—*M. J. Blish.* (Biological Abstracts)

SINGSEN, E. P., L. D. MATTERSON, ANNA KOZEFF, R. H. BUNNELL, and E. L. JUNGHERR. (U. Connecticut, Storrs.)

STUDIES ON ENCEPHALOMALACIA IN THE CHICK. 1. THE INFLUENCE OF A VITAMIN E DEFICIENCY ON THE PERFORMANCE OF BREEDING HENS AND THEIR CHICKS. *Poultry Sci. 33:* 192-201. 1954.—Six pens of breeding hens were maintained on a low-fat, semi-purified vit. E deficient diet which was also known to be borderline or deficient in several of the B-complex vits. Dietary variables introduced were alpha-tocopherol, vit. A and D feeding oil and a vit. mixture containing Ca-pantothenate, pyridoxine, p-aminobenzoic acid, inositol, biotin, thiamine, folic acid, choline, ascorbic acid and vit. K. Egg production was not influenced by any of the dietary variables. Fertility was improved by alphatocopherol, in absence of the complex vit. mixture, but not in its presence. Positive encephalomalacia, as diagnosed by histological examination, was produced in a small number of day-old chicks and pipped but unhatched, 21-day embryos. Chicks hatched from the breeder lot fed the complex vit. mixture showed a marked increase in blood tocopherol levels indicating that 1 or more of these known vits. influences the utilization of tocopherols. A high incidence of encephalomalacia could be produced by feeding a vit. E-low diet containing 2% vit. A and D feeding oil to chicks hatched from the vit. E deficient hens. The level of alpha-tocopherol in the breeding ration markedly affected susceptibility of the chicks to encephalomalacia.—*Auth. summ.* (Biological Abstracts)

SKULMOWSKI, J., and W. TYTRO. (Inst. Zootech., Oddzial Paszoznawstwa, Dzial Zywienia Zwierzat.) Russian and English summaries.

WSPOLCZYNNIKI STRAWNOSCI NIEKTORYCH PASZ, UZYWANYCH DO ZYWIENIA DROBIU. [DIGESTIBILITY COEFFICIENTS OF CERTAIN POULTRY FEEDS.] *Rocz. Nauk. rol [B], 66:* No. 3, 21-42. 1953.—Many of the digestibility coefficients at present in use are obsolete. Coefficients were estimated for wheat, barley, maize, oats, rye, soya bean, meat-and-bone meal, bloodmeal and a mash of crushed oats, wheat and maize, barley bran and meat-and-bone meal. The results are presented in a table with the figures given by other workers. (From summary.)—*T. D. Bell.* (Nutrition Abstracts and Reviews)

SLINGER, S. J., and W. F. PEPPER. (Ontario Agric. Coll. Guelph., Canada.)

THE EFFECT OF ANTIBIOTICS ON THE TURKEY POULTS' NEED FOR SUPPLEMENTARY BIOTIN AND PANTOTHENIC ACID. *Poultry Sci. 33:* 633-637. 1954.—The feeding of an Aureomycin vit. B_{12} supplement to turkey poults brought about marked remission of symptoms including poor growth, broken feathers, dermatitis, perosis and diarrhea. Penicillin and Terramycin were found to reduce the poult's requirement for biotin. Penicillin also reduced the poult's requirement for Ca pantothenate. The "sparing" effect of antibiotics on the poult's requirement for biotin and pantothenic acid offers a partial

explanation for the drugs' ability to bring about remission of deficiency symptoms. Improved utilization of other vits., such as niacin, is probably also involved.—*S. J. Slinger.* (Biological Abstracts)

SLINGER, S. J., W. F. PEPPER, and I. MOTZOK. (Ontario Agric Coll., Guelph, Canada.)

INTERRELATIONSHIP BETWEEN VITAMIN E AND PHOSPHORUS IN PREVENTING PEROSIS IN TURKEYS. *Jour. Nutrition 52:* 395-403. Illus. 1954.—Groups of Broad Breasted Bronze turkeys were fed adequate diets containing all combinations of 0.3, 0.5 and 0.7% total inorganic P and O, 2.5, 5.0 and 7.5 I.U. of supplementary vit. E/lb. of feed from hatching through 24 wks. of age. Grain was fed with the mash for the 8- through 24-wk. period. Based on the growth data, there appeared to be little or no interrelationship between vit. E and P. Levels of 0.5% inorganic P and 2.5 I.U. of supplementary vit. E/lb. of feed appeared adequate for opt. growth but these levels were not sufficient for perosis prevention. Both vit. E and P aided in reducing the incidence and severity of perosis, with complete prevention being achieved when the diets contained 0.7% inorganic P and 5.0 I.U. of supplementary vit. E/lb. of feed.—*Auth. (courtesy Wistar Bibl. Serv.)*

SPINKA, J. (Biochemical Institut, Prague, Czechoslovakia)

INTERESTING DEFICIENCY OF VIT. C IN HENS IN THE EARLY SPRING MONTHS. [ZAJIMAVY PROJEV NEDOSTATKU VITAMINU C U NOSNIC V PREDJARI.] *Drubeznictvi, I, 9:* 168-169. 1953.—In the early spring months of 1953 hens were kept in batteries without green fodder which had sufficient amounts of all vitamins except vitamin C. At the highest laying rate in March the hens showed pathological signs. Although active, they were lying on one side, but had no cramps and did not lose their balance. After application of concentrated vitamin C, these symptoms disappeared within 4 days. It has been found that the cause is the bleeding into the muscles and joints, especially of the legs as a consequence of the disturbance of the lining of vessels.—*V. Orel.*

STEKOL, J. A., P. T. HSU, S. WEISS, and P. SMITH. (Lankenau Hosp. Res. Inst., Philadelphia, Pa.)

LABILE METHYL GROUP AND ITS SYNTHESIS *DE NOVO* IN RELATION TO GROWTH IN CHICKS. *J. Biol. Chem., 203:* 763-773. 1953.—Pullets, 3 days old, in groups of 6 to 10, received a basal diet deficient in choline and methionine, containing, per cent, soya bean protein 23, maize starch 61.7, salt mixture 6, maize oil 5, succinyl-sulphathiazole 1.0, L-cystine 0.3, glycine 1.0 and agar 2, with added vitamins except B_{12}. Groups of them received supplements of homocystine, dimethylethanolamine, betaine and vitamin B_{12}, singly or in combination, for 5 weeks, after which each received a single intraperitoneal injection of radio-active methionine-CH_3-C^{14}, choline-CH_3-C^{14}, or betaine-CH_3-C^{14}, and was killed 20 hr. later.

With all the diets addition of vitamin B_{12} increased the rate of growth. Homocystine and dimethylethanolamine enhanced the effect of vitamin B_{12}. The best growth was obtained with all 4 supplements together, but homocystine, dimethylethanolamine and betaine without vitamin B_{12} gave good growth. No perosis was seen in any bird which received dimethylethanolamine, but all other groups showed some degree of perosis, which was not correlated with rate of growth.

Isolation of radio-active choline, creatine and creatinine from the carcases indicated that transfer of C^{14} from methyl groups of methionine or betaine to choline or creatine, or from choline to creatine, was not dependent on dietary vitamin B_{12}. C^{14} was incorporated into creatine from choline less efficiently than from methionine or betaine. Addition of homocystine to the basal diet increased transfer of C^{14} from choline and betaine to creatine. Synthesis of the labile methyl group in the absence of dietary methionine and choline is thought to be adequate provided that homocystine with vitamin B_{12} or betaine is present.—*D. Duncan.* (Nutrition Abstracts and Reviews)

STURKIE, PAUL D. (Rutgers U., New Brunswick, N. J.), **E. P. SINGSEN, L. D. MATTERSON, ANNA KOZEFF, and E. L. JUNGHERR.** (U. Connecticut, Storrs.)

THE EFFECTS OF DIETARY DEFICIENCIES OF VITAMIN E AND THE B COMPLEX VITAMINS ON THE ELECTROCARDIOGRAM OF CHICKENS. *Amer. Jour. Vet. Res. 15:* 457-462. 1954.—Adult Barred Plymouth Rock females were fed diets deficient in E and certain B complex vits., vit. E alone, and B complex vit. alone for approx. 7 to 9 mos. Vit. E deficiency alone did not affect egg production or mortality appreciably but it did produce abnormal ecgs. in a considerable number of birds. When the diets were deficient in E and B complex vits., the mortality was slightly higher but egg production was not affected. The incidence of heart disorders for birds depleted of E and B complex vits. was no greater than for those depleted of B or E vits. alone, but the type of anomalies differed somewhat. Right axis deviation was rare in the birds fed the diet deficient in B vit. alone, but it was common in the E-depleted, and E- and B-depleted groups. The principal abnormalities of E-deficient hens included right axis deviation, premature ventricular systoles, sinus arrhythmia, and elevated S-T segments. Sinus arrhythmia, per se, is not considered abnormal in some mammals and in the pigeon, but it rarely occurs in normal chickens.—*P. D. Sturkie.* (Biological Abstracts)

SUZUOKI-ZIRO and SUZUOKI-TUNEKO. (Res. Lab., Takeda Pharmaceutical Industries, Ltd., Osaka.)

THE CONCENTRATIVE UPTAKE OF THIAMINE ALKYL DISULFIDES BY RABBIT OR CHICK BLOOD CELLS. *J. Biochem., Tokyo, 40:* 11-20. 1953.—The authors found that alkyl disulphides of vitamin B_1 had almost the same activity for rice birds as vitamin B_1 (unpublished). In the present work it is shown that they were taken up *in vitro* by the blood cells of rabbits or chicks to reach a considerable concentration within the cell. Vitamin B_1, its disulphide and pyrophosphate were not taken up at all. The alkyl disulphides of vitamin B_1 are fat-soluble, and it is considered that they could diffuse through the lipid membrane of the cell.—*E. M. Hume.* (Nutrition Abstracts and Reviews)

TARR, H. L., A. J. BIELY, and B. E. MARCH. (U. British Columbia, Vancouver.)

THE NUTRITIVE VALUE OF HERRING MEALS. 1. THE EFFECT OF HEAT. *Poultry Sci. 33:* 242-250. 1954.—Herring meals were prepared from whole herring presscake at different seasons by drying at elevated temps. Portions of low-temp. meals were heated for 30, 60 or 180 min. at 149°C. Chick growth rates were considered lower with rations containing 17-21% of the commercial flame-dried herring meals than with similar amts. of meals dried at low temps. Supplementation of rations containing the commercial meals with a mixture of vits. of the "B complex" raised the nutritive value of the commercial meals to that of the low temp. meals. A folic acid deficiency was largely responsible for the above observed difference, and an inadequate content of thiamine, biotin and inositol contributed to this. Heating low-temp. herring meals for 30 or 60 min. at 149°C. did not lower their nutritive value, but in 13 of 17 expts. in which comparisons were available, chicks grew better with the heated meals. Heating for 180 min. caused serious impairment in nutritive value which was only slightly overcome by the addition of lysine. The nutritive value of herring meals produced in Feb. was more adversely affected by the 180-min. heating than was that of Nov.-produced meals, and the probable reason for this is discussed.—*H. L. A. Tarr.* (Biological Abstracts)

WAIBEL, P. E., W. W. CRAVENS, and C. A. BAUMANN. (Dept. Poultry Husb., Coll. Agric., Univ. Wisconsin, Madison.)

EFFECT OF DIETARY ANTIBIOTICS ON THE GROWTH OF CHICKS RECEIVING SUBOPTIMUM AMOUNTS OF THIAMINE BY MOUTH OR BY INJECTION. *J. Nutrition, 50:* 441-450. 1953.—Day-old chicks received for from 11 to 28 days the vitamin-B_1-deficient

diet described by Robblee *et al.* (Abst. 3767, Vol. 18), carbohydrate being either sucrose or dextrin, supplemented orally by 1.0, 1.5 or 6.0 μg. vitamin B_1 per g. diet. With each dose one group received no further supplement, and another got 35 p.p.m. aureomycin or 15 p.p.m. penicillin. With the largest amount of vitamin B_1, the antibiotics increased growth by 9.5 per cent, and with 1.5 μg. per g. growth was increased by 50 per cent by aureomycin and 69 per cent by penicillin; with 1.0 μg. per g. the increase was 45 and 57 per cent, respectively, and the survival time also was increased. Utilization of feed was more efficient when antibiotics were given. A mixture of penicillin, aureomycin, bacitracin and streptomycin was as effective as penicillin alone. The effects were not observed when vitamin B_1 was given subcutaneously, and differences in weight between the groups were much less.

Replacement of 1 per cent carbohydrate in the diet by glycerol improved the stability of vitamin B_1 in the diets. It is concluded that vitamin B_1 was used as efficiently from the diet as when injected if losses caused by instability before ingestion or by the activity of the intestinal flora were avoided. As much as 5 per cent glycerol had no adverse effect on the growth of the chicks or their efficiency of feed utilization.—*V. R. Jackson.* (Nutrition Abstracts and Reviews)

WILD, H., and G. H. COOPER.

MEXICAN CLOVER *(RICHARDIA BRASILIENSIS)* AS A GREEN FEED FOR POULTRY. *Rhodesia Agric. J. 50:* 192-194 1953.—The moisture content of Mexican clover was 73.0 per cent and its composition on a dry matter basis was: ash 13.3, protein 21.3, oil 1.9, fibre 25.5, N-free extract 38.0 per cent. The ash contained Ca 4.9, MgO 0.7, P_2O_5 0.8, K_2O 3.3, SiO_2 3.4 per cent.

All classes of poultry ate the chopped plant with relish and preferred it to chopped alfalfa to which they were accustomed. No adverse effect was observed when the plant was given with the usual concentrates for several months.—*P. C. Jowsey.* (Nutrition Abstracts and Reviews)

WILGUS, H. S., and I. L. MADSEN. (Colorado Agric. Expt. Sta., Fort Collins.)

THE EFFECT OF ALFALFA MEAL ON EARLY GROWTH OF CHICKS. *Poultry Sci. 33:* 448-459. 1954.—Feeding trials with chicks on 100 samples of alfalfa meal, showed that, when each of these meals was incorporated into a high-density ration at a 10% level, approx. one-fifth markedly depressed early growth, one-third caused moderate depression, and half had no effect. Three samples exerted serious depression. Both sun-cured and dehydrated meals were inhibitory to growth. The inhibition did not involve production factors, nor was it due to fiber nor to ash constituents. Meals fed at levels below 5% appeared to improve early growth occasionally, but as the levels increased beyond 5%, growth declined proportionately. Fiber content and bulk were considered to be more important factors than the so-called inhibitor in limiting the amt. of alfalfa used in chick rations.—*H. Branion.* (Biological Abstracts)

WILSON, A. A., and B. EASTWOOD. (Res. Dept., Boots Pure Drug Co., Ltd., Thurgarton, Notts.)

EXPERIENCES WITH THE FEEDING OF PROCAINE PENICILLIN TO POULTRY. *Vet. Rec., 65:* 665-668. 1953.—A control group of 30 chicks was housed intensively and fed from day-old to 8 weeks of age on a commercial starting mash, and then on a commercial growing mash. Three parallel groups received the same treatment with the addition of 2, 4 or 10 g. procaine penicillin per ton feed. At 16 weeks of age the mean weight of the control birds was 4 lb. 7 oz., and that of those receiving penicillin was 7 oz. greater. There was no significant difference between the mean weights with the different levels of penicillin.

In a field trial with similar rations a control group of 170 cockerels had a mean weight of 3 lb. 10 oz. at 15 weeks of age, and 2 similar groups that had received 2.5 g. procaine penicillin per ton mash had a mean weight 4 oz. greater. In both these trials there was a tendency for feed conversion to be more efficient, by 3 to 6 per cent, in the birds

receiving penicillin than in the controls.

A group of 27 poults was reared from hatching to 16 weeks of age on commercial rations and finished with a mean weight of 8 lb. 6 oz. Two further groups received the same treatment with supplements of 15 g. procaine penicillin per ton mash. All groups also received grain in amounts increasing to 50 per cent of their total feed by the end of the growing period.

The turkeys receiving penicillin had a mean weight of 1 lb. 14 oz. above that of the control group. There was a tendency for the difference to be greater with the females than with the males. The control group and one group receiving penicillin were weighed again at 24 weeks of age; the latter were heavier by 2 lb. 3 oz.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

WILSON, J. E. (Minist. Agric. Fish., Eskgrove, Lasswade.)
THE EFFECTS OF PENICILLIN SUPPLEMENTS TO THE DIET OF TURKEY POULTS AND CHICKS. *Vet. Rec., 65:* 633-639. 1953.—Turkey poults were reared from hatching to 4 weeks of age in wire-floored brooders and fed to appetite on a commercial dry "starter" mash. They were then transferred to solid floors and fed on "grower's mash," with a free choice of grain in addition after they were 12 weeks of age. In a series of 3 trials with 140 birds 47 per cent died during the rearing period, and the survivors finished at 23 weeks of age with a mean livewight of 6660 g. Parallel groups receiving the same treatment with the addition to their mash of 12 g. procaine penicillin per ton suffered only 14 per cent loss and the survivors had a mean finishing weight 12 per cent greater than that of the unsupplemented controls. The males receiving penicillin were 14 per cent and the females 10 per cent heavier than the corresponding controls.

The greatest effect of penicillin was observed in the first 4 weeks, when most of the deaths occurred, and at 4 weeks of age the supplemented birds were 51 per cent heavier than the surviving controls. In further studies poults which had received penicillin only till they were 12 weeks of age gave a result not significantly different from parallel groups of birds that received the supplement from hatching to 23 weeks of age.

These trials were made in equipment that had been in use for several years. In short-term trials with new and isolated equipment poults with or without penicillin grew and survived as well as those raised in the old equipment and receiving supplementary penicillin.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

WISMAN, E. L. R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State U., State College.)
THE INFLUENCE OF COMBINING AND INTERCHANGING ANTIBIOTICS IN CHICK DIETS. *Poultry Sci. 33:* 290-293. 1954.—Three antibiotics, Terramycin, penicillin and streptomycin were used to supplement a plant protein type broiler diet singly and in combination or were interchanged at 3 wks. in a study to 10 wks. of age on growth rate of 364 battery reared male crossbred chicks. Whether the antibiotics were added singly or in combination the total concn. was always equivalent to 5 g. of free base per ton of diet. Terramycin and penicillin produced comparable growth to 10 wks. when fed either singly or as a mixture or when 1 replaced the other at 3 wks. of age. Streptomycin was less effective to 10 wks. both when it was fed singly and when it was used as a replacement for either Terramycin or penicillin at 3 wks. of age. At the concn. employed penicillin compensated for the ineffectiveness of streptomycin when they were fed in mixtures whereas Terramycin did not.—*R. V. Boucher.* (Biological Abstracts)

WISMAN, E. L., R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State U., State College.)
THE INFLUENCE OF AN ANTIBIOTIC, ANIMAL PROTEIN, SEX AND REARING ENVIRONMENT ON CHICK GROWTH. *Poultry Sci. 33:* 328-332. 1954.—An expt. of 2X2X2X2 factorial design was conducted with 800 New Hampshire chicks to study the influence of anti-

biotic supplementation, animal protein in the diet, sex and rearing environment on growth to 12 wk. of age. A higher rate of growth resulted when chicks were reared in batteries than in colony houses, in males than in females, when animal protein replaced part of the plant protein in the diet, and when the diet was supplemented with Terramycin. The gains due to animal protein in the diet were greater in the battery than in the colony house groups, in males than in females, and in the unsupplemented groups than in those that received Terramycin. The addition of either animal protein or Terramycin to a plant protein type diet produced comparable increases in rate of growth but a combination of the 2 resulted in a further increase in rate of gain. Growth variability was less in chicks reared in batteries than in colony houses, in chicks fed a diet that contained largely plant protein than one that contained both plant and animal protein, and in females than in males. Terramycin supplementation reduced variability only when animal protein was present in the diet.—*R. V. Boucher.* (Biological Abstracts)

PATHOLOGY

ADLER, H. E., R. YAMAMOTO, and R. A. BANKOWSKI. (U. California, Davis.)

A PRELIMINARY REPORT OF EFFICIENCY OF VARIOUS MEDIA FOR ISOLATION OF PPLO FROM EXUDATES OF BIRDS WITH C. R. D. *Amer. Jour. Vet. Res. 15:* 463-465. 1954.—A comparative study was made of several standard media for the isolation of pleuropneumonia-like organisms (PPLO) from chicken and turkey exudates. One medium which was composed of a 10% blood agar slope overlaid with a 20% horse serum PPLO broth appeared to be the most satisfactory for the isolation of PPLO.—*H. E. Adler.* (Biological Abstracts)

ANGSTROM, C. I., and JOHN S. SICKLES. (Cornell Vet. Coll., Ithaca, N. Y.)

ATTEMPTS TO CONTROL FOWL CHOLERA BY MEDICATED FEEDS. *World's Poultry Sci. Jour. 10:* 47-48. 1954. (Biological Abstracts)

BUREAU OF ANIMAL INDUSTRY, U.S. DEPT. AGRIC.

LYMPHOMATOSIS RESEARCH YIELDS SIGNIFICANT RESULTS. *World's Poultry Sci. Jour. 10:* 55-57. 1954.—Data indicate that inoculation with the filtrable agent of visceral lymphomatosis may enable more stringent selection in the development of lines of birds resistant to naturally occurring lymphomatosis. (Biological Abstracts)

COLES, R. (Min. Agric., Eng.)

LYMPHOMATOSIS AND THE BREEDER'S PROBLEM. *Poultry Sci. 33:* 350-360. 1954.—The economic importance of lymphomatosis to the poultry industry is discussed. It is argued that rearing in isolation is the only sound policy for the table egg producer to follow to avoid heavy losses from the disease. The situation of the breeder is extremely difficult in that chicks from stock, bred without resistance to the disease may result in heavy losses to the purchaser if he is unable to follow the rearing system urged. Exptl. work in breeding a resistant strain of S.C. White Leghorns over 6 yrs. is descr. and an account of the costs incurred given. It is concluded that breeding for resistance to lymphomatosis, is too costly for all but very large and financially strong breeding farms.—*R. Coles.* (Biological Abstracts)

HARE, J. H., G. C. ANDERSON, C. E. WEAKLEY, JR., and J. K. BLETNER. (W. Virginia Agric. Exp. Sta., Morgantown.)

FACTORS CONTRIBUTING TO A HEMORRHAGIC CONDITION IN EXPERIMENTAL CHICKS FED SIMPLIFIED RATIONS. *Poultry Sci. 32:* 904-905. 1953. (Nutrition Abstracts and Reviews)

POULTRY PRODUCTS AND MARKETING

ADRIAN, J. (Lab. Biochim. Nutrit., C.N.R.S., Bellevue.)
TENEURS DE L'OEUF DE POULE EN RIBOFLAVINE, NIACINE ET ACIDE PANTOTHENIQUE. [THE RIBOFLAVIN, NICOTINIC ACID AND PANTOTHENIC ACID CONTENT OF HEN'S EGGS. VARIATIONS AND CORRELATIONS.] *Ann. Agron.*, No. 3, 17-29. 1952, 1952.—Estimations were made of riboflavin, nicotinic and pantothenic acids in hen eggs from a commercial source from April to mid-May, and in eggs from Rhode Island Red hens in batteries receiving for 3 weeks a controlled diet from about mid-June to mid-July. The eggs were plunged into boiling water and cooked for 10 min. before the estimations were made.

In the commercial eggs, the whole egg contained 4.6 μg. riboflavin per g., the ratio of the percentage in the yolk to that in the white being 1. Corresponding values for pantothenic acid were 19.8 and 4.6, and for nicotinic acid 0.6 and 0.39. Small eggs contained relatively more riboflavin and pantothenic acid than large eggs, but there was little difference in nicotinic acid concentration.

Hens under controlled conditions produced from 1 to 10 eggs each during the test; there was considerable variation in the vitamin content of both yolks and whites and of the ratios from hen to hen. The content of riboflavin and pantothenic acid in the yolks of the eggs was fairly constant in the eggs from any one hen, but the amount in the whites decreased as more eggs were laid. No similar observation was made for nicotinic acid. The average weight of the eggs was 46 g.; the contents in μg. per g. were riboflavin 4.4, nicotinic acid 0.6 and pantothenic acid 26.5; in the commercial eggs riboflavin was slightly more concentrated in the yolks; the ratios for the other vitamins were the same as in the commercial eggs. Of the amount ingested by the birds, the percentage in the eggs was 11.4 for riboflavin, 0.065 for nicotinic acid and 25.2 for pantothenic acid.—*V. R. Jackson.* (Nutrition Abstracts and Reviews)

ADRIAN, J.
CONTINGENCE OU AUTONOMIE DE L'OEUF DE POULE VIS-A-VIS DE L'EQUILIBRE VITAMINIQUE DE LA MERE. CAS DES SURCHARGES EN ACIDE PANTOTHENIQUE ET EN NIACINE. [DEPENDENCE OR INDEPENDENCE OF THE HEN'S EGG ON THE VITAMIN BALANCE OF THE HEN. TEST ADMINISTRATION OF PANTOTHENIC AND NICOTINIC ACIDS.] *C.R. Acad. Sci., 237:* 273-274. 1953.—Six hens received for 2 weeks a diet containing per kg. 14 mg. Ca pantothenate and 100 mg. nicotinic acid, and then for 2 weeks a diet with 375 mg. Ca pantothenate and 1250 mg. nicotinic acid. The two vitamins were estimated in the eggs.

When the vitamin supplements were increased there was a 15 per cent increase of the nicotinic acid content of the egg followed by a fall to the original value; pantothenic acid increased 3.5 times. During the first period the percentage of ingested nicotinic acid and pantothenic acid retained in the egg was 35 and 0.17, respectively, and during the second period 4.5 and 0.016. The maximum values obtained for the egg were 7 mg. per cent for pantothenic acid and 0.1 mg. per cent for nicotinic acid.—*V. R. Jackson.* (Nutrition Abstracts and Reviews)

BAUER, H., P. ZIMMERMAN, and A. E. VOSS. 1953. (Tierhyg. Inst., Univ. Freiburg; ditto; and C. F. Boehringer u. Söhne, Mannheim.) English summary.

DAS CHEMISCHE KAPAUNISIEREN VON HAHNCHEN. [CHEMICAL CASTRATION OF COCKERELS.] *Arch. Geflügelk., 17:* 37-53.—The literature is reviewed. A series of 10 experiments on 861 cockerels was carried out using German, French, Swiss and American oestrogenic preparations, to study dosage levels and duration of action, the optimum age of castration and length of fattening period, weight gains made by hormonal and surgical castrates and uncastrated ♂♂, and meat quality. (Animal Breeding Abstracts)

BAUM, E. L., and H. G. WALKUP. (Dept. Agric. Econ., State Coll., Washington.)
SOME ECONOMIC IMPLICATIONS OF INPUT-OUTPUT RELATIONSHIPS IN FRYER PRODUCTION. *J. Farm Econ. 35:* 223-235. 1953.—The economic implications of the nutritional requirements of table poultry are examined. Two aspects of the problem are considered: possible variations in the daily ration from full feed conditions, and optimum weights of birds at sale.

A knowledge of the functional nature of feed requirements and of the relation between the market value of table poultry and the price of poultry feeds is necessary when deciding whether table birds should at all times have as much food as they will eat. It is suggested that when the table poultry:feed price ratio is 5:1 it pays to give the birds all the feed they will take during the early stages of growth but when they approach 9 to 12 weeks of age they should be given less than that amount.

Table poultry are produced in lots, and information on the relation between feed intake and liveweight increases is normally obtained from sample data. It is shown that corrections must be made in order to use these data for policy decisions on pens of birds.

The market value of table poultry per lb. changes little with increase in weight. It is therefore important to know the selling weights which tend to maximize the total weight of poultry obtained from a given intake of feed. Graphs are presented showing the relation between the increasing weights and profits of birds (1) when the price of feed increases while the market value of table poultry remains unchanged and (2) when the value of table poultry falls while the price of feed remains constant.

Consideration is also given to the economic implications of using high energy feeds to which antibiotics have been added and the concluding paragraphs deal with the possible effect of some of the fixed costs on management decisions.—*J. H. Smith.* (Nutrition Abstracts and Reviews)

BOBBY, F. C., and W. R. BELWORTHY. 1954. (Dept. Agric., Wellington.)
ADVANTAGES OF CHEMICAL CAPONIZATION OF COCKERELS. *N.Z.J. Agric., 88:* 19, 21.—Comparisons were made between surgically and chemically caponized and untreated Australorp × White Leghorn cockerels. There were 25 birds in each group aged 10 wks. at the start of the experiment. The total gains in weight between the 14th and 26th weeks were 3:00 lb., 3.43 lb., and 2.81 lb. for the 3 groups resp. Capons of both groups consumed about 5 lb. more food than untreated cockerels. The quality of the carcass of capons, both as regards market appearance and palatability, was better than that of the cockerels. The best age for slaughter as regards these characters appeared to be 21-22 wks. There was no difference in growth and carcass quality between the 2 types of capon. With chemical caponization there is less likelihood of losses, and birds suffer no set-back. (Animal Breeding Abstracts)

BURDA, Z. (Laboratory of the Food Milk Industry, Czechoslovakia)
THE DETERMINATION OF EGG YOLK OIL IN THE EGG POWDER WITH BUTYROMETER. [STANOVENI ZLOUTKOVEHO OLEJE VE VAJECNEM PRASKU BUTYROMETREM.] *Prumysl Potravin, V, 3:* 128-130. 1954.—For industrial practice the rapid method for the determination of egg yolk oil in egg powder is recommended. The results obtained with this method are satisfactory in comparison with determination by extraction by means of chloroform and ether. During the time required for the determination of egg yolk oil by extraction 20 times as many determinations may be executed. In a Teichert butyrometer 1.25 g. of egg powder, 8 to 9 ml. of distilled water, 10 ml. sulphuric acid (d 1.82) is put and after stopping and shaking is centrifuged at the rate of 1200 revolutions per minute for 5 minutes. The results given by this method at the butyrometer is to be calculated by the factor 0.801 determined for this purpose by the author. The determination is exact to 0.5%.—*V. Orel.*

COLES, R. (Minist. Agric. Fish., 1-4 Cambridge Terr., Regent's Park, London, N.W.1.)

THE PRODUCTION OF TABLE POULTRY. *J. Sci. Food Agric., 4:* 532-539. 1953.—Weight gains and feed consumption were recorded weekly for 15 groups of Light Sussex cockerels, 5 of North Holland Blues, 2 of New Hampshires and 1 of Marans. Each group consisted of 30 purebred birds housed in a concrete-floored building on deep litter and each bird had 3 sq. ft. of floor space. They were fed from day-old to 20 weeks on a dry mash of ground grains, groundnuts and fishmeal with grassmeal, bone flour, vitamin D_3 and manganized salt. Nitrofurazone was added as a coccidiostatic.

The results are given in detail for each breed. The average growth rate increased to the tenth week when the average weight was 3.28 lb., the average total feed consumption 10.06 lb. and the cumulative feed conversion ratio 3.06:1. After the tenth week average growth rate declined until the 16th week, then increased substantially and continued to do so until the end of the test at 20 weeks. Carcase condition and fleshing quality improved to a peak at the end of the tenth week; fleshing quality declined thereafter.

The results indicated that birds not specially bred for the table may be successfully reared for this purpose. An 11-week-old bird weighing about 3¼ lb. offers the best means of increasing the availability of poultry meat at a reasonable price to the consumer and with an adequate profit to the rearer. The cost of the feed given was taken to be 40s. per cwt. and on this basis a 3¼ lb. bird at 11 weeks of age ate about 4s. 4d. worth of feed, equivalent to 1s. 2d. per lb. The feed cost per lb. of bird increased rapidly after the twelfth week. At 20 weeks the cost per lb. was on the average just over 2s. The large-sized roaster of about 6 lb. seems likely to remain within the luxury market.—*P. C. Jowsey.* (Nutrition Abstracts and Reviews)

COTTERILL, O. J., and A. W. NORDSKOG. (Iowa State Coll., Ames.)

INFLUENCE OF AMMONIA ON EGG WHITE QUALITY. *Poultry Sci. 33:* 432-434. 1954.—Shell eggs may come into contact with ammonia in a laying house where a "built-up" deep litter program is in effect or where manure is permitted to accumulate in the droppings pits for long periods of time. To simulate this condition, eggs were placed in desiccators to which different concns. of ammonia were added. It was demonstrated that ammonia in the atmosphere surrounding shell eggs increases the transmission of light (lowers the extinction coefficient) raises the pH, and hastens the deterioration of interior quality as measured by Haugh units. In addition, these factors would lower the candled grade of the egg by rendering the yolk shadow more defined.—*O. J. Cotterill.* (Biological Abstracts)

COTTERILL, O. J. (Iowa State Coll., Ames), and **A. R. WINTER.** (Ohio State U., Columbus.)

EGG WHITE LYSOZYME. I. RELATIVE LYSOZYME ACTIVITY IN FRESH EGGS HAVING LOW AND HIGH INTERIOR QUALITY. *Poultry Sci. 33:* 607-611. 1954.—Eggs from various sources were scored for albumen quality and analyzed for lysozyme activity to determine the possible relationship between albumen quality and lysozyme activity. Composite samples of eggs of high (above 85 Haugh units) and low (below 65 Haugh units) albumen quality did not vary appreciably in total solids, total protein or lysozyme activity. Eggs from different hens and from different strains showed a wide variation in albumen quality, total solids, total protein and lysozyme activity.—*O. J. Cotterill.* (Biological Abstracts)

DAVIS, LYLE L., and MARSHALL E. COE. (Virginia Agric., Expt. Sta., Blacksburg.)

BLEEDING OF CHICKENS DURING KILLING OPERATIONS. *Poultry Sci. 33:* 616-619. 1954.—Birds incompletely bled during the killing operations are often unacceptable to consumers. Blood trapped in small blood vessels under the skin, and particularly in larger veins and arteries in the wings, make the birds unattractive. Good bleeding has

come to mean a step toward good quality. In commercial operations, good bleeding within a very limited period of time is often difficult. In order to determine whether the method of inducing bleeding had any influence on the amt. of blood that drained from the birds in the 1st 20 seconds, 50 broilers were divided into 5 lots. In lot 1, a single artery was cut; in lot 2, both arteries were cut; in lot 3, the birds were beheaded; in lot 4, the birds were debrained and both arteries cut; in lot 5, the birds were stunned with a sharp blow to the head and a single artery cut. As much as 30% better bleeding was secured when both arteries were cut with or without debraining, or when the birds were stunned and a single artery cut when compared to beheaded and single artery cut birds.—*L. L. Davis.* (Biological Abstracts)

DAWSON, L. E., and C. W. HALL. (Michigan State Coll., East Lansing.) RELATIONSHIP BETWEEN RATE OF COOLING, HOLDING CONTAINER, AND EGG QUALITY. *Poultry Sci. 33:* 624-628. 1954.—Egg cooling tests were conducted in an exptl. model of a commercial egg cooler in June, July, August, and December, 1952, and January, 1953. Quality changes in eggs held at 60°F., 45°F., and 75°F. Albumen quality declined rapidly during the first 3 days at all temps. Quality of albumen held at 75°F. continued to decline rapidly through 14 days of holding. Very little differences were noted in quality of eggs held at 32°F. and 45°F. The albumen quality score of newly laid eggs averaged 2.5 (U.S.D.A. score). During holding the quality declined to average "A" (score of 5.0) in 7 days at 75°F., 14 days at 60°F., 21 days at 45°. Eggs held at 32°F. still had an albumen score of 4.0 after 21 days. Albumen score and candled index were detd. at the end of 3, 7, and 14 days.—*L. E. Dawson.* (Biological Abstracts)

ELLIOTT, R. PAUL. (U.S. Food and Drug Admn., San Francisco.) SPOILAGE OF SHELL EGGS BY PSEUDOMONADS. *Appl. Microbiol. 2(3):* 158,164. 1954.—Stored shell eggs were more rapidly infected by exposure to *Pseudomonas ovalis* than freshly laid eggs, as detd. by a black-light (near u.v.) candler manufactured by Vogel Luminescence Company, San Francisco. Sterile black-light fluorescent spots sometimes appeared in the albumen before bacteria penetrated the inner membrane. Once penetration occurred, reproduction was rapid. Fluorescent spots in the albumen always spread through the entire albumen if the egg remained in the shell. Fully fluorescent eggs had bacteria counts of 10^7 to 10^9 per g. Soft cooking enhanced ability of a panel to detect odors of decomposition in *Pseudomonas*-infected eggs. Decomposition odors were detected in fully fluorescent eggs 69 to 92% of the time. Odorous compounds produced by pseudomonads in shell eggs will sometimes evaporate through the shell.—*R. P. Elliott.* (Biological Abstracts)

EVANS, ROBERT JOHN, J. A. DAVIDSON, and DORIS H. BAUER. Michigan State Coll., East Lansing.) CHANGES IN COMPOSITION OF CRUDE EGG PROTEIN PREPARATIONS WHEN KEPT UNDER REFRIGERATION FOR SEVERAL YEARS. *Poultry Sci. 33:* 208-209. 1954.—Crude egg yolk and white protein prepns. were assayed for methionine, cystine, and lysine 8 and 49 mos. after preparation. Acid hydrolysis and microbiological assay procedures were used. Little change in methionine concn. occurred in the 41 mos. between the 2 sets of assays. There was a 14.0% decrease in lysine concn. and a 21% decrease of cystine in the egg proteins.—*R. J. Evans.* (Biological Abstracts)

FEENEY, ROBERT E., and L. R. MacDONNELL. (West. Utilization Res. Branch, Albany, Calif.) HIGH TEMPERATURE TREATMENT OF SHELL EGGS. *Food Technol. 8(5):* 242-245. 1954.— High temp. treatment of shell eggs for short periods of time greatly reduced development of a fluorescent *Pseudomonas* sp. in artificially contaminated eggs. The treatment temps. were varied between 212° and 1832°F. and times of exposure between 0.5 and 10 sec. Time intervals between infection and treatment were varied from 10 min. to 72 hrs. Most of the expts. were performed at

212°F. by immersion of eggs in boiling water, because of its simplicity and effectiveness. Almost complete protection against fluorescent spoilage was obtained when the immersion time was 2 to 3 secs. and the time interval between infection and immersion was 24 hrs. or less. These results indicate that short-time, high-temp. treatment may be effective if applied soon after shell infection. Adequate commercial and farm trials of the process are mandatory to evaluate its practical significance and utility.—*R. E. Feeney.* (Biological Abstracts)

FRANCISCO RAIMO, H. (Div. Zootec. Nutricao Animal.) English summary.

O MARRECO PEQUIM COMO PRODUTOR DE CARNE. [THE PEKIN DUCK AS MEAT PRODUCER.] *Bol. Indust. animal, Sao Paulo, 13:* 111-117. 1952.—From birth to 9 weeks of age 29 White Pekin ducklings ate on the average 8056 g. feed per head and reached an average liveweight of 2255 g. At this age sex did not significantly affect liveweight.

Ten ducks of each sex were killed at 9 weeks of age. Dressed and drawn but with head and feet, the carcases weighed on the average 80.6 per cent of the liveweight; without head and feet they weighed 65 per cent. Edible meat was 69.6 per cent of dressed weight.

The edible meat had the following composition: water 70.0, protein 22.7, fat 4.1, ash 3.1 and matter not estimated 0.1 per cent.—*P. C. Jowsey.* (Nutrition Abstracts and Reviews)

FUNK, E. M., JAMES FORWARD, and MARTHA LORAH. (U. Missouri, Columbia.)

MINIMIZING SPOILAGE IN SHELL EGGS BY THERMOSTABILIZATION. *Poultry Sci. 33:* 532-538. 1954.—Spoilage in shell eggs held in cold storage was minimized by using sufficient heat to pasteurize the contents. Surface cleaning was not effective. Green whites were practically eliminated by immersing shell eggs for 15 min. in water at 130°F. or 5 min. at 140°F. These treatments also prevented sour eggs, must eggs and other rots.—*H. Branion.* (Biological Abstracts)

HARNS, J. VIVIAN, E. A. SAUTER, B. A. McLAREN, and W. J. STADELMAN. (Washington State Coll., Pullman.)

RELATIONSHIP OF SHELL EGG QUALITY AND PERFORMANCE OF EGG WHITE IN ANGEL FOOD CAKES. *Food Res. 18(4):* 343-350. 1953.—Fresh eggs were stored at 21.7°C. for 1 to 5 wks. and at 0°C. cold storage, with and without oil treatment. One group was kept at 55°F. for one wk., treated with oil and held in cold storage. The eggs, kept at room temp. were sampled weekly and those at 32°F. were tested after 2, 4, and 6 mo. intervals. After 6 mos. in cold storage a sample was removed and placed at room temp. for 2 wks. Eggs were candled, broken out, and the albumen index was measured. A taste panel scored cakes for color, flavor, texture and grain, tenderness and general acceptability. The data were analyzed statistically. Correlation coefficients indicated close relationships between albumen index and angel food cake measurements. Cold storage treatments and controlled humidity storage maintained egg quality at a sufficiently high level to produce satisfactory angel food cakes for period up to 6 mos. under conditions of this study.—*B. A. McLaren.* (Biological Abstracts)

JOSLIN, ROBERT P., and BERNARD E. PROCTOR. (Massachusetts Inst. Technol., Cambridge.)

SOME FACTORS AFFECTING THE WHIPPING CHARACTERISTICS OF DRIED WHITE EGG POWDERS. *Food Technol. 8(3):* 150-154. 1954.—Expts. to investigate the cause of the poor whipping characteristics of reconstituted whole egg powders demonstrated that the failure of dried whole eggs in foam tests and baking tests is related to the loss of emulsifying action and liberation of free oil from the yolk. Photomicrographs of a drying egg film corroborate the conclusion that free oil is responsible for anti-foam action. Washing dried whole egg powders with a fat solvent (acetone) removed their anti-foam action and allowed them to be whipped to voluminous foams. Certain types

of emulsifiers enabled re-formation of the emulsion of fat in water so that such rehydrated products could be whipped. Although sulfonates served to illustrate the nature of the cause of the poor foaming volume, they are not proposed as commercial additives to dried whole egg powders. More generally admissible emulsifying agents were tried, including monoglycerides, partial fatty esters of sorbitan, and polyethylene derivatives of these sorbitan esters. Expts. demonstrated that the particular sorbitan fatty esters tried prevented oil exudation during drying but acted as anti-foam agents.—*R. P. Joslin.* (Biological Abstracts)

KAVALE, J. (Poultry Industry, Brno, Czechoslovakia)

EGG FILLER FROM POLYVINILCHLORID. [VLOZKA NA VEJCE Z POLYVINILCHLORIDU.] *Prumysl Potravin, V, 3:* 135-136. 1954.—A new type of egg filler for 30 dozen wood egg cartons is recommended. The form of this filler is according to the Danish type, but instead of cottonwood they are produced of polyvinichlorid. The principal advantage of this filler is that they may undergo the cleaning and the disinfection in liquid up to the temperature of 50°C. and therefore are very hygienic. Very important is also that the eggs on this filler may be candled all together.—*V. Orel.*

KLOSE, A. A., and M. F. POOL. (West. Reg. Res. Lab., Albany, Calif.)

EFFECT OF SCALDING TEMPERATURE ON QUALITY OF STORED FROZEN TURKEYS. *Poultry Sci. 33:* 280-289. Illus. 1954.—Broad Breasted Bronze turkeys subjected to various exptl. conditions of scalding, chilling, and packaging were stored at −5°F. for periods up to 12 mos. and then evaluated with regard to moisture losses, appearance in frozen, thawed and roasted state, peroxide development in the raw fat from the stored bird and organoleptic qualities of the roasted carcass. No appreciable rancidity developed in any exptl. group, based on either organoleptic or peroxide tests. Variations in scalding temp. or method of chilling had no appreciable effect on tenderness of the roasted muscle of the turkeys studied. Certain modifications in the cooking method reduced toughness of roasted skin from turkeys scalded at high tempts. Results of these studies suggest that turkeys scalded at higher (140°F.) temps. represent an acceptable product for frozen storage if proper moisture control is maintained throughout, from slaughtering to consumption.—*A. A. Klose.* (Biological Abstracts)

MECCHI, E. P., M. F. POOL, and A. A. KLOSE. Proc. (W. Reg. Res. Lab., Bur. Agric. Indust. Chem., U.S. Dept Agric., Albany, Calif.)

THE ROLE OF TOCOPHEROL CONTENT IN THE STABILITY OF CHICKEN AND TURKEY FATS. *Poultry Sci. 32:* 915-916. 1953. (Nutrition Abstracts and Reviews)

KODINEC, GY, and A. SCHUSCHKA.

THE IMPROVEMENT OF YOUNG POULTRY. [A NOVENDEK-BAROMFIAK FELJAVITASA.] *Agrártudomány,* Budapest, 1954. 5. pp. 150-154.—To supply larger quantities and good quality killed (slaughtered) poultry belongs also to the tasks of the state-farms, it is therefore desirable that more and more farms should go in for the improvement and fattening of culled poultry. The Managements of a great number of farms still see great difficulties in the accomplishment of this task, that f.i., there are no fattening premises provided with coops, (crates) etc. Therefore, the authors set up experiments at the Research Institute for Small Animals, Godollo, to study the fattening of culled poultry. After informatory experiments made in coops, a second experiment was made with a great number of poultry, in groups, in empty poultry houses. According to the findings of the authors, young poultry can successfully be fattened without any particular equipments. Groups of about 100-150 animals were placed in houses provided with small sized runs. Resting being important for poultry, moving was limited and therefore the chickens were only allowed to spend a short time in the run. With the exception of the feeding time, the houses were constantly

kept in semi-darkness. After the consumption of the evening ration of mixed-food an additional portion of maize-grits was given. The poultry were fed three times daily and water was given liberally and regularly. By this method, healthy animals reached a weight-increase of 30-40% within 15 days. (Hungarian Agricultural Review)

KUBELKA, V., and V. OREL. (Research Institut for Milk and Eggs, Prague, Czechoslovakia)

THE USE OF INEDIBLE EGG WASTE IN THE LEATHER INDUSTRY. [ZUZITKOVANI VAJECNEHO ODPADU V KOZEDELNEM PRUMYSLU.] *Prumsyl Potravin, V, 6:* 262-5. 1954.—We tried to produce technical yolk according to Uspjenskij by preservating the egg content with 3% NaCl and 0.1-0.2% $K_2Cr_2O_7$ using the entire waste of inedible eggs including spoiled eggs by preserving them with 15% NaCl and 0.2% sodium benzoan. The technical yolk with bichromate has many disadvantages for parts of the egg white separate irregularly and makes the industrial production very difficult. Consistency of this product is irregular, a fact which in leather industry occasions great difficulties. Potassium bichromate has only a temporary preservation effect and progressing reduction also diminishes the bactericide capacity so that the stored product soon undergoes decomposition. Spoiled eggs are unfit for the production of technical yolk of both sorts. Experiments in tanneries showed that the technical yolk has a lower emulgation capacity and the resulting insufficient fattening of the pig skin for production of velours and nubucs or of glove hides. The technical yolk with sodium benzoan has the best results.—*V. Orel.*

NEWELL, GEORGE W., and GEORGE F. GODFREY. (Oklahoma A. and M., Stillwater.)

THE RELATIONSHIP BETWEEN BREAST ANGLE AND BREAST YIELD IN BROILERS. *Poultry Sci. 32:* 360-364. 1954.—Four hundred and three New Hampshires, Silver Oklabars, and reciprocal crosses between these breeds were raised to a marketable wt. in the same house at different seasons of the yr., to stimulate conditions under which a processor might buy broilers commercially. Prior to killing, birds were weighed and their breast angle was measured with the West Virginia Breast-meter. After being dressed, the broilers were water-cooled overnight, and then eviscerated and cut up. The wt. of the breast expressed as percent of live body wt. was related to breast angle by multiple regression technique. The percentage breast of live body wt. was mainly dependent on the live body wt. of the broiler. The additional variation in percent breast of live wt., not explained by live wt. alone, ranges from 0.2% to 31.3%. Avg. for the 8 groups is between 7 and 8%.—*G. W. Newell.* (Biological Abstracts)

OREL, V. (Research Institut for Milk and Eggs, Prague, Czechoslovakia)

THE QUALITY OF EGGS PRESERVED IN COLD STORAGE AND IN LIME WATER. [SROVNANI JAKOSTI VAJEC KONSERVOVANYCH VE VAPENNEM ROZTOKU A V CHLADIRNE.] *Prumysl Potravin, V, 8:* 368-371. 1954.—Experiments were conducted with the storage of hen eggs in cold storage and in lime water. Before storage and after 3, 6, and 9 months of storage the eggs were analyzed. During cold storage the loss of weight was 2.89%, 6.07%, and 7.26% and in lime water 0.44%, and after 6 and 9 months 0.89% was the increase of the weight of eggs. The height and index of the thick egg white were getting down simultaneously. The index changed from the value before storage 0.0669 in cold storage to 0.0647, 0.0593 and 0.0490. In lime water to 0.0608, 0.0472 and 0.0409. The pH value of egg white in cold storage eggs increased from 9.1 to 9.4, whilst in lime water preserved eggs it decreased down to 8.4. The volume of the beaten air into the foam of egg white decreased during storage: in cold storage eggs from 500% to 460% and in lime water eggs to 390%. The beating time for egg white of these eggs was prolonged by 60 sec. at the speed of 15000 revolutions per min. The stability of the foam in cold storage eggs was a little lower than the stability of the lime water preserved eggs.

The results of these experiments show that during the storage of shell eggs of the same quality in cold storage and in lime water their

technological quality decreased in both preservation methods and that in lime water this decrease is only slightly greater.—*V. Orel.*

POOL, M. F., E. P. MECCHI, HANS LINEWEAVER, and A. A. KLOSE. West. Reg. Res. Lab., Albany, Calif.)

THE EFFECT OF SCALDING TEMPERATURE ON THE PROCESSING AND INITIAL APPEARANCE OF TURKEYS. *Poultry Sci. 33:* 274-279. 1954.—Turkeys were scalded at temps. ranging from 120 to 140°F. for 60 sec. and at 125°F. for 30, 60, and 120 sec. Feather-pulling force, which increased in a consistent manner with decrease in scalding temp., was directly correlated with the amt. of feathers remaining on the birds after they passed through a commercial line of mechanical pickers. Wt. gains of New York dressed turkeys chilled in slush ice for 18 hrs. averaged more than 2%, with no significant differences between scald temps. Moisture losses by the birds during air chilling ranged from 1.0 to 2.7%. Greatest loss occurred in birds scalded at the highest temp. With adequate retention of moisture in the skin surface throughout chilling, packaging and freezing, turkeys scalded at 140°F. had an acceptable appearance in the fresh chilled or frozen state.—*A. A. Klose.* (Biological Abstracts)

SAUTER, E. A., J. VIVIAN HARNS, W. J. STADELMAN, and BARBARA A. McLAREN. (State Coll. Washington, Pullman.)

SEASONAL VARIATIONS IN QUALITY OF EGGS AS MEASURED BY PHYSICAL AND FUNCTIONAL PROPERTIES. *Poultry Sci. 33:* 519-524. 1954.—Eggs produced by Single Comb White Leghorn and New Hampshire hens each fed 2 different diets were compared as to physical quality, functional and flavor properties. Comparisons were made with eggs 1 day old produced during the mos. January through July and with eggs stored for periods of 1 to 5 wks. produced during winter and summer seasons. No significant differences were observed in functional or flavor properties of fresh eggs produced during the different mos. There was a consistent seasonal decline in physical quality. Winter eggs were significantly superior to summer eggs in their keeping quality for 1-5 wks. at 72°F. with respect to physical quality, functional properties and flavor.—*W. J. Stadelman.* (Biological Abstracts)

SCOTT, W. J., and J. R. VICKERY.

STUDIES IN THE PRESERVATION OF SHELL EGGS. VII. THE EFFECT OF PASTEURIZATION ON THE MAINTENANCE OF PHYSICAL QUALITY. *Australian Jour. Appl. Sci. 5:* 89-102. Illus. 1954.—Effects of pasteurization in water and oil on the physical quality of shell eggs were studied through its effects on the amt. and retention of thick white, the yolk index values, losses of wt. during storage, candling quality, and the quality of sponge cakes. The major effects reported by Funk (1943) were confirmed. Funk's results were extended to measure the effects of pasteurization in the range 57.5 to 67.5°C. for periods less than ,equal to, and greater than the "limiting times." For pasteurization in water for the limiting times, the lower the temp. the more effective is the stabilization, which becomes negligible at 67.5°C. Pasteurization has not been found to affect yolk index values, wt. losses during storage, or the functional properties of eggs when used as ingredients in sponge cakes.—*Auth. summ.* (Biological Abstracts)

SULC, J. (Research Institut for Milk and Eggs. Czechoslovakia)

THE TUBE PASTEURIZATION OF THE LIQUID EGG. [PASTERACE VAJECNE MELANZE TRUBKOVYM PASTEREM.] *Prumysl Potravin, V, 8:* 355-362. 1954.—A new type of tube pasteurizer for liquid egg is recommended. Before pasteurization the homogenization by means of a rack or centrifugal pump is recommended. The constructed type of this pasteurizer has the efficiency of the regeneration of 50-60%. The passage of liquid egg through the pasteurizer is continuous without coagulation and after the regeneration the liquid eggs are cooled down to 2°C. The attendance and cleaning of this pasteurizer is very simple. The temperature of pasteurization is 60-62°C. for a

period of 3 minutes. The pasteurization is very efficient and total number of microorganisms is diminished by 98.7-99.9% and germs of Bacterium Coli from 99.6 to 100%. During pasteurization the solid matters of liquid eggs do not change, the acidity diminishes by 20-40%, the beating quality is unchanged and the baking properties improve by 10-15%. The experiments with this pasteurizer prove to be suitable for industrial production of liquid eggs. This pasteurizer will be produced in our country.—*V. Orel.*

SWICKARD, MARY T., ALICE M. HARKIN, and BETTY J. PAUL. (U.S. Dept. Agric., Washington, D.C.)

RELATIONSHIP OF COOKING METHODS, GRADES, AND FROZEN STORAGE TO QUALITY OF COOKED MATURE LEGHORN HENS. *U.S. Dept. Agric. Tech. Bull.* 1077. 1-32. 1953.—Meat of steamed and simmered White Leghorn hens was generally somewhat higher in quality than meat from pressure-cooked hens, as shown both by taste panel evaluations and mechanical tests for tenderness and moistness. Dark meat from hens stored frozen at 0°F. 7 to 9 mos. was significantly less tender and the light meat had more off-flavor than corresponding meat from hens stored frozen 0 to 2 mos. Under some conditions of age, length of frozen storage, and method of cooking, the meat of grade A hens was more moist and had more chicken flavor than that of grade B and grade C hens; under other conditions meat from grade B as well as grade A hens had better texture and more chicken flavor than that from grade C hens. There were no significant differences among grades in tenderness and absence of off-flavor. When samples from steamed Rhode Island Red hens were used for reference in evaluating samples from the Leghorn hens of the same age, panel scores showed that the quality of the meat from steamed Leghorn hens compared favorably with that of the Rhode Island Red samples except in texture of dark meat and chicken flavor of dark meat.—*M. T. Swickard.* (Biological Abstracts)

MANAGEMENT

BAUMAN, V. K. 1952.

VYRASCIVANIE CYPLJAT PRI PONIZENNOM TEMPERATURNOM REZIME. [REARING CHICKS AT A LOWERED TEMPERATURE REGIME.] *Zootech. zoohig. Inst. Raksti* [*Riga*], *2:* 167-215. (B.)—Until 2½ mths. old 50 White Leghorns were kept at an average temperature of 10.5°C. and 50 at a normal temperature averaging 21.8°C. Metabolism, the blood picture and the weight of the internal organs were studied. In the experimental birds testis weight was appreciably lower. Ovary weight and comb growth were less. The live weight of the experimental birds was greater throughout; food utilization was not appreciably different. After 2½ mths. all the birds were kept together under normal conditions; differences diminished. The experimental birds came into production 7 days earlier, and in their 1st year produced an average of 22 eggs more; egg weight averaged 2 g. more. (Animal Breeding Abstracts)

CARSON, J. R., and W. A. JUNNILA. (Dept. Poultry, Univ. Connecticut, Storrs.)

ULTRAVIOLET IRRADIATION OF THE TURKEY HEN. *Poultry Sci. 32:* 87-873. 1953.—Groups of 10 Broad Breasted Bronze turkey pullets from 270 to 304 days old were housed in a small-windowed house without outside run. Three lighting regimes were allotted at random to duplicate groups: (1) incandescent light with maximum intensity 6.4 foot-candles, (2) ultraviolet light with 95 per cent of the lamp energy output in the range 280 to 320 mμ. and maximum light intensity 0.9 foot-candle, (3) incandescent and ultraviolet light (as above) giving a maximum light intensity of 7.9 foot-candles, all measured at bird level. Each group had a 14-hr. light day. Fifty per cent production in group 2 houses was reached 6 days later than in group 1 and 3 houses.

The monthly average egg production of the groups for February, March, April, May and June was 39, 197, 150, 110 and 114; 7, 180, 146, 154, 89; 35, 207, 180, 187 and 150, respectively.—*M. J. Head.* (Nutrition Abstracts and Reviews)

DARROW, M. I., and C. E. STOTTS. (Swift and Company, Chicago, Ill.) THE INFLUENCE OF DEBEAKING BROILERS UPON GROWTH RATE, FEED UTILIZATION, AND MARKET QUALITY. *Poultry Sci. 33:* 378-381. 1954.—The percentage of bareback birds occurring in commercial broiler flocks has become a major problem to poultry processors in recent years. The primary cause of "bareback" broilers was found to be feather picking beginning when birds are 3.7 wks. of age. The use of debeaking as an immediate control for feather picking was therefore investigated. Field tests were conducted during the summer of 1952 to determine the effect of debeaking upon growth rate, feed utilization, and market quality. These tests were conducted in 3 major broiler areas in 10 broiler flocks consisting of approx. 30,000 broilers. In each flock, half of the birds in a house were debeaked at 3-4 wks. of age and half maintained as controls. The results obtained showed that debeaking improved feed utilization approx. 0.1 per lb. of grain and eliminated "barebacks." The percent top grade was improved approx. 10%. Growth rate was not influenced by the debeaking operation. Additional tests, with 4 broiler type crossbreds, were conducted to determine if debeaking at day-old would adversely effect performance. The data indicate that growth rate and mortality are not adversely influenced by properly debeaking chicks at 1 day of age.—*M. I. Darrow.* (Biological Abstracts)

FELTWELL, R.
INTENSIVE METHODS OF POULTRY MANAGEMENT. *Minist. Agric. Fish. Bull.* No. 152, July 1952, pp. iv + 62. H.M.S.O. London. Price 3s net.—The deep litter, poultry yard and battery systems are described in detail, and housing, management, feeding and egg production under each system are discussed. The introductory part contains advice and recommendations on the system to adopt, choice of breed, choice of site, and culling and replacements.—*T. D. Bell.* (Nutrition Abstracts and Reviews)

GERRIETS, E. (Abt. Geflügelkrank., Humboldt Univ., Berlin.) English summary.
VERGLEICHENDE KUKENAUFSUCHTVERSUCHE NACH VETERINARHYGIENISCHEN GESICHTSPUNKTEN UND AUFSUCHTVERSUCHE UNTER VERWENDUNG DER ALTSTREUVERFAHREN. [COMPARATIVE TRIALS IN CHICK REARING FROM THE POINT OF VIEW OF VETERINARY HYGIENE AND EXPERIMENTS IN REARING ON DEEP LITTER.] *Berl. Münch. Tierärztl. Wochenschr., 66:* 385-392. 1953.—After a review of the literature the results of an experiment made in a manner similar to those of Mehner (Abst. 1114, Vol. 23) are reported. Four groups of 400 chicks each were used and the experiment lasted 8 weeks. Groups 1 and 2 were kept on a layer of chopped straw 5 cm. deep which was replaced at first daily and then weekly. Group 2 had under-floor heating. Group 3 was kept on a layer 25 cm. deep built up of alternate layers of old hen litter and old garden mould. Group 4 was kept similarly but fresh horse manure replaced the hen manure. There was little difference in liveweight gain or feed utilization over the 8-week period; if anything, those in group 1 were poorer than those in the other groups. The results were in general agreement with those of Mehner and did not show any great advantage of deep litter.—*W. Godden.* (Nutrition Abstracts and Reviews)

HAYS, F. A. (U. Massachusetts, Amherst.)
ARTIFICIAL LIGHT FOR ACTIVATING MALES AND FEMALES TO HIGHER FERTILITY.—*Poultry Sci. 33:* 321-327. 1954.—A study was made comparing the effects of different exposures to all-night lights and to morning lights on fertility in Rhode Island Red

males and females of various ages. Data collected over a 5-yr. period furnish information on several points. All-night light treatment of birds for a period of 30 days had a definite stimulating effect on the fertility of cocks when mated to pullets. Morning lights given for 60 days to yearling males mated to pullets had no significant effect on fertility as the season advanced. Cockerels mated to old hens and birds exposed to all-night lights for 60 days showed no significant effects. Cockerels mated to old hens and birds exposed to morning lights for 60 days gave no response in fertility. Old males and old hens when mated and exposed to morning lights gave no reaction. Exposure of old males for 80 days and old hens for 60 days gave significant lowering of fertility as the breeding season advanced. In the last yr. of the test, matings between old males and old hens when males were exposed to morning lights for 80 days and females for 60 days, there was a significant increase in fertility as the hatching season advanced. In general, our data indicate that a 30-day exposure to all-night lights gives the best result with old males. There is evidence that longer exposures to all-night lights may reduce fertility. Cockerels are little affected by artificial light, and there is little evidence that females of various ages are affected as far as fertility is concerned.—*F. A. Hays.* (Biological Abstracts)

KARAPETJAN, S. K. 1953. (Acad. Sci., Armenian S.S.R.)
VLIJANIE SVETOVOGO REZIMA NA RAZVITIE GENERATIVNYH ORGANOV I PRODUKTIVNOSTJ DOMASNEI PTICY. [THE EFFECT OF LIGHT REGIME ON THE REPRODUCTIVE ORGANS AND PRODUCTION OF DOMESTIC POULTRY.] *Agrobiologija (3):* 47-54. 1953.—At the Arabkir Experimental Base of the Armenian Institute of Animal Breeding, egg production was increased by subjecting hens to light for 15 hrs. 39 mins. daily; the percentage increase varied in different flocks (to some of which reference is made), the response of local hens being the greatest. Some 3-, 4- and 5-mth-old birds were put in 3 subgroups which were subjected resp. to 16 hrs. light daily, normal daylight, and 8 hrs. light daily. Additional light increased testis and pituitary weights considerably in birds of all 3 age groups; ovary and oviduct weights of 3-mth-olds, and ovary weight of 4-mth-olds were not affected; oviduct weight of 4- and 5-mth-olds, and ovary weight of 5-mth-olds were increased considerably. In birds of all age groups subjected to 8 hrs. light daily the weights of these organs were less than those of the controls. Between 15th Jan. and 15th April 60 controls produced 1209 eggs averaging 48.4 g. each *v.* 1919 eggs averaging 51.5 g. each produced by 60 hens subjected to 16 hrs. light daily; the hens subjected to 8 hrs. light daily produced fewer eggs of a greater av. weight than did the controls. The production of hens subjected to 24 hrs. light daily did not differ appreciably from that of hens subjected to 16 hrs. light daily and av. egg weight was 1 g. less. The experimental pullets subjected to additional light came into production earlier, and those subjected to curtailed light came into production later than did the controls. (Animal Breeding Abstracts)

KELLY, J. W., E. W. GLAZENER, and W. L. BLOW. (North Carolina Agric. Expt. Sta., Raleigh.)
MORE EGGS, LESS WORK—NEW FEEDING METHOD. *World's Poultry Sci. Jour. 10:* 52-55. 1954. (Biological Abstracts)

RAGAB, M. T., and M. A. ASSEM. (Dept. Animal Breeding, Fac. Agric., Fouad I Univ., Cairo.)
EFFECT OF ATMOSPHERIC TEMPERATURE AND DAYLIGHT ON EGG WEIGHT AND YIELD IN FAYOUMI AND BALADI FOWLS. *(Poultry Sci. 32:* 1021-1027. 1953.—The records of 286 Baladi and 245 Fayoumi pullets were studied. Both breeds, indigenous to Egypt and of obscure origin, produce in a year only 154 small eggs: the average egg weights were 36.6 and 41.0 g., respectively. Egg number and size both decreased as atmospheric temperature increased. Increasing length of daylight increased egg production, but the full effect was not realized, since simultaneously increasing temperature

counteracted it. In the first laying year egg size increased gradually up to the eighth or ninth month and then remained constant. There was no positive correlation between egg weight and the number of eggs produced.—*T. D. Bell.* (Nutrition Abstracts and Reviews)

ROSENBERG, M. M., and T. TANAKA. (U. Hawaii, Honolulu 14.)
POULTRY MANAGEMENT STUDIES.—IV. PERFORMANCE OF SINGLE COMB RHODE ISLAND REDS HATCHED OUT-OF-SEASON IN HAWAII. *Hawaii Agric. Expt. Sta. Bull. 108:* 1-18. 1953. —It was found that pullets hatched in the fall produced the most eggs and showed the highest hen-house and hen-day production records. In this study, the pullets hatched during the summer laid better and the winter-hatched pullets laid poorer than those hatched in the spring. Fall-hatched pullets produced eggs of greatest market value, followed in descending order by pullets hatched in the spring, summer, and winter. "Fall" pullets showed greatest economy of feed conversion. They required 5.61 lbs. of feed to produce a dozen eggs, while the summer-, spring-, and winter-hatched pullets required 5.89, 6.01, and 6.31 lbs. of feed, respectively. "Fall" pullets also showed greatest biweekly egg income, followed in descending order by the winter, summer, and spring hatches. No significant effect of season was observed on fertility, hatchability, livability, and body wt. of pullets taken at 18 wks. When weighed at 12 wks., however, the "winter" pullets were significantly heavier than the other 3 groups, followed in sequence by the spring, fall, and summer hatches. Ability of unprotected pullets to produce eggs was definitely affected by season. The performance of the 4 flocks showed that the ability of a Rhode Island Red pullet to produce eggs was impaired during practically any portion of her laying yr. by gusty trade-winds and short daylength. This study also showed that the maintenance of an ordinary flock through a 2d yr. of production is inefficient. When the performances of the 4 flocks were combined, the same birds as hens required 39.8% more feed to produce a dozen eggs and their biweekly hen-day egg income was 73.1% that of their pullet yr. In contrast to her pullet yr., the avg. hen produced thinner-shelled eggs (2.0%), more broken eggs (158.2%), a higher percentage of meat- and blood-spot eggs (100.0%), and a smaller yolk index (6.4%). The albumen index during the yearling production yr. was superior to that of the pullet yr. (3.8%).—*M. M. Rosenberg.* (Biological Abstracts)

ROSENBERG, M. M., and T. TANAKA. (U. Hawaii, Honolulu, 14.)
POULTRY MANAGEMENT STUDIES.—III. A COMPARISON OF SINGLE-COMB WHITE LEGHORNS REARED AND MAINTAINED ON LITTER AND WIRE FLOORS. *Hawaii Agric. Expt. Sta. Bull. 107:* 1-19. 1952.—Single Comb White Leghorn chicks were randomized into 2 groups in each of 2 trials undertaken 28 days apart. One group was reared and maintained on litter in confinement; the other was raised exclusively on wire floors. Data were collected continuously from 18 to 130 wks. of age on egg production, egg size, meat- and blood-spot eggs, double-yolk eggs, broken and soft-shelled eggs, feed consumption, body wt., and mortality. No culling was exercised at any time. Data were arbitrarily separated in to 2 parts: from 18 to 78 wks. of age, and 78 to 130 wks. of age. During the 1st yr. of lay, the hen-day production of pullets reared and maintained in confinement on litter was 59.0 and 59.3% whereas the respective wire-floor birds averaged 48.6 and 44.0%. When the hen-housed egg income of each group was calculated, the litter-housed pullets in trial 1 produced $2.72 more eggs than the wire-floor controls; and, in trial 2, the difference between the 2 systems of management was $4.00/ bird, again in favor of the "litter" birds. These differences were primarily influenced by the uniform drop in production of the 2 wire-floor control groups when subjected to strong, gusty fall and winter trade winds. Our strain of S.C. White Leghorns did not lay well when exposed to strong winds. This phenomenon has now been observed in 2 consecutive yrs. in 2 separate investigations. Body size of pullets was also found to be markedly influenced by the system of management. Although the replicated groups were very similar in body wt. at 18 wks. of age, there was a significant difference

at 78 wks. of age. At that time the "litter" hens in trial 1 exceeded their controls by 0.29 lb., while those in trial 2 exceeded their controls by 0.33 lb. Although the litter-maintained birds consumed more feed, when the total feed consumption was divided by the total dozens of eggs produced, no significant difference was obtained either between treatments or trials. Furthermore, the 2 contrasting systems of management resulted in no significant differences in egg size, meat- and blood-spot eggs, broken and soft-shell eggs, and henhouse mortality. The yearling hen production was much poorer during the 2d yr. of lay. Whereas the surviving "litter" birds in trials 1 and 2 laid only 69.9 and 78.0% as many eggs as did the survivors of the pullet yr., the wire-floor controls laid 77.7 and 96.7% as well. There were no significant differences between the 2 systems of management in egg size, meat and blood spots, and broken and soft-shell eggs. However, in both trials the litter-maintained hens produced fewer defective eggs.—*M. M. Rosenberg.* (Biological Abstracts)

GENERAL

BASTIAN, J. W., and M. X. Zarrow. (Purdue U., Lafayette, Ind.)

AN AUTOMATIC RECORDING DEVICE FOR THE TIME OF OVIPOSITION IN HENS. *Poultry Sci. 33:* 619-622. 1954.—An automatic device for recording the time of oviposition in the hen is descr. The instrument consists of an electric kymograph which is caused to rotate 1 revolution every 15 min. (or every hr. as desired), by using a modified electric clock and a switching arrangement. An arm on the kymograph shaft passes over a series of flat screw heads and makes electrical contact with each in sequence. These screws are connected individually with a switch located on each cake and so arranged that its contact is closed when an egg is present. In addition, the needle carriage of a dictaphone mounted on end is used to lower the signal magnet for each successive recording. It is possible to record the daily time of 40 hens with this device.—*M. X. Zarrow.* (Biological Abstracts)

FRINGS, H. M. K. 1953. (State Inst. Poult. Breed., Beekbergen.)

EENDENHOUDERIJ VOOR VLEESPRODUCTIE IN DE VERENIGDE STATEN. [THE REARING OF DUCKS FOR MEAT PRODUCTION IN THE UNITED STATES.] *Landbouwvoorlichting, 10:* 384-387.—In the U.S.A. ducks are bred almost exclusively for meat. The main breed is the Pekin. Of the 69 duck farms found in an area of about 1800 ha. in Long Island, New York, 67, which are organized into a sales cooperative, produce about 13.6 million kg. of ducks a year, representing about 50% of the annual U.S. consumption. It is estimated that each laying duck produces 80-90 ducklings a year, and sometimes as many as 100-110. Strict selection of breeding stock, based on external characters, is carried out at 6 wks., and again at 8-9 wks. (age of slaughter), at 7 mths. (beginning of laying), and at the end of the 1st laying year. Drakes are kept for only one season. Live weight at slaughter is 2.5-2.9 kg. (av. about 2.7 kg.) and dressed weight about 1.6-2.3 kg. (Animal Breeding Abstracts)

GERICKE, A. M.

WHEATEN LACED AUSTRALORPS. *World's Poultry Sci. Jour. 10:* 45-46. 1954.—At the annual conference of the S. African Poultry Assoc., Port Elizabeth, April, 1953, the Wheaten Laced Australorp bred by Mrs. Myrtle Phillips was officially recognized as a new variety. This is the 3d variety bred in South Africa.—*Auth. summ.* (Biological Abstracts)

(*Note:* Beginning with this issue abstracts are also included from "Animal Breeding Abstracts" and "Nutrition Abstracts and Reviews.")

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The Annual General Meeting of the Swiss Branch was held in Zurich on January 15th. Invitations to attend the conference which followed were sent to members of the German Branch and to others in Germany and Austria. Altogether, there was an audience of about 170. Three reports on the papers presented at the recent World's Poultry Congress were submitted, one by Professor Dr. E. Hess and two by Mr. E. Duttlinger. Afterwards Professor D. C. Romijn of Utrecht University (Netherlands) gave an interesting and instructive lecture on "Investigations on Incubation Technique."

FAO REPORT ON CHICKEN FEEDING IN EUROPE

A report entitled "Chicken Feeding in Europe," edited by Dr. Hans Engler, Poultry Specialist, Animal Production Branch, Agriculture Division has been published by the Food and Agriculture Organization of the United Nations. It is available in English, French and Spanish. Copies may be obtained by request from the Information Service, F.A.O., Vialle delle Terme di Caracalla, Rome, Italy or through the F.A.O. North American Regional Office, 1325 "C" St., S.W., Washington 25, D.C., U.S.A.

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Receipts		
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Advertising	2,488.57	200- 0- 0
Subscriptions	362.50	10- 7- 2
Congress reports and back volumes	37.75	6- 0
Miscellaneous	2.75	
Transfer from Major Macdougall	2,200.49	
TOTAL	$11,463.20	£2387-17- 2
Expenditures		
Printing Journal	$ 3,863.08	
Clerical and administrative	606.50	£120- 0- 0
Postage	550.64	25-11- 7
Supplies (letterheads, envelopes, forms, printing, stencils, etc.)	195.84	11- 0- 9
Abstracts	42.00	19- 0- 0
Translations	——	10-13- 1
President's administrative	——	90- 0- 0
Editor	400.00	
Associate Editor	120.00	
Subscriptions and reprints	21.04	
Congress expenses—Treasurer	991.81	
Congress expenses—Secretary	——	91-18- 6
Congress expenses—President	——	69- 8- 4
Congress expenses—Council	——	3-10- 0
Bank charge	——	1- 0-11
Rebate to Branches	——	78-19- 9
Miscellaneous	——	3-19-11
Transfer to Treasurer	——	805-13- 0
Transfer to Savings	2,000.00	
TOTAL	$ 8,790.91	£1330-15-10
Balance December 31, 1954	$ 2,672.29	£1057- 1- 4
Savings Account		
Balance, December 31, 1953	$10,565.67	
Deposits	$ 2,000.00	
Interest	263.36	
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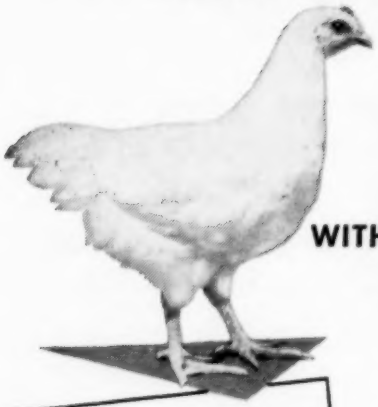

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- U.S.I. CHOLINE CHLORIDE (25% dry or 70% solution)
- U.S.I. MENADIONE MIXES (vitamin K_3)
- U.S.I. RIBOFLAVIN Products
- U.S.I. NIACIN
- U.S.I. CALCIUM PANTOTHENATE Products
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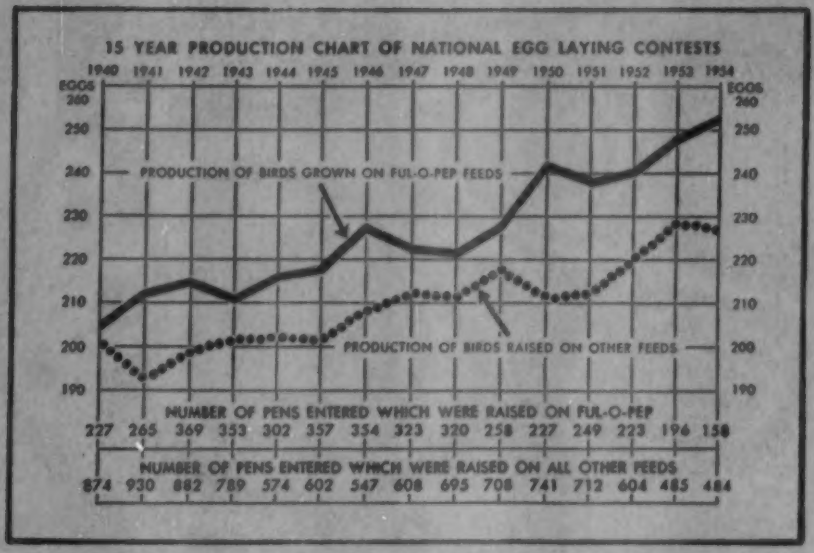
15 YEAR PRODUCTION CHART OF NATIONAL EGG LAYING CONTESTS
1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954
EGGS
260
250
240
230
220
210
200
190
PRODUCTION OF BIRDS GROWN ON FUL-O-PEP FEEDS
PRODUCTION OF BIRDS RAISED ON OTHER FEEDS
NUMBER OF PENS ENTERED WHICH WERE RAISED ON FUL-O-PEP
227 265 369 353 302 357 354 323 320 258 227 249 223 196 158
NUMBER OF PENS ENTERED WHICH WERE RAISED ON ALL OTHER FEEDS
874 930 882 789 574 602 547 608 695 708 741 712 604 485 484

Birds grown on Ful-O-Pep average laying the equivalent of 15.6 MORE 2-OZ. EGGS EACH

INFORMATION PRESENTED in the above chart is excellent proof that Ful-O-Pep grows America's Best Pullets.

YOU WILL NOTE that for the past 15 years in these official contests, 54,537 Ful-O-Pep raised birds averaged laying the equivalent of 15.6 more 2-oz. eggs each than the average of 133,978 birds grown on all other feeds. And during this time over half of the winning pens and hens were grown on Ful-O-Pep.

IN THE 1954 CONTESTS Ful-O-Pep raised birds averaged laying the equivalent of 26 more 2-oz. eggs each than birds grown on all other brands of feed. Ful-O-Pep feeders also won high pen in 6 and high hen in 6 of the 11 official tests.

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